

INORGANIC CHEMISTRY



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PERIODIC TABLE

- Correct order of ionic Radii is :-
 (1) $\text{Yb}^{+3} < \text{Pm}^{+3} < \text{La}^{+3} < \text{Ce}^{+3}$
 (2) $\text{Ce}^{+3} < \text{Yb}^{+3} < \text{Pm}^{+3} < \text{La}^{+3}$
 (3) $\text{Yb}^{+3} < \text{Pm}^{+3} < \text{Ce}^{+3} < \text{La}^{+3}$
 (4) $\text{Pm}^{+3} < \text{La}^{+3} < \text{Ce}^{+3} < \text{Yb}^{+3}$
- If periodic table would have contained 10 periods, maximum elements in that P.T. would be ?
 (1) 72 (2) 190 (3) 144 (4) 290
- Which of the following statement is not correct?

		23		
	A			
B				
		C		

- Atomic no. of A, B, C are 40, 57, 105 resp.
 (2) Group no of A, B, C are IV B, III B and V B respectively
 (3) Period no of A, B, C are, 4th, 5th and 6th resp.
 (4) C is a radioactive element
- In elements, the incoming electron occupies which subshell after (n-1)d subshell :-
 (1) np (2) ns (3) (n-1)d (4) (n+1)s
- Which two elements are in same period as well as in same group of periodic table ?
 (1) Z = 23, Z = 31 (2) Z = 65, Z = 66
 (3) Z = 52, Z = 87 (4) Z = 58, Z = 46
- Incorrect statement for radius of 3d series metal/ions:
 (1) Metallic radius of Mn is higher than that of Cr and Fe
 (2) I.E._{II} of Mn is greater than I.E._2 of Cr
 (3) Fe, Co, Ni have almost same atomic radius
 (4) Irregular trend of atomic radius on moving from Sc to Zn
- Which of the following statement is not correct
 (1) Inert gases have a different number of outermost electrons than their group number
 (2) In the sixth period the orbitals being filled are 6s, 4f, 5d, 6p
 (3) The second transition series contains the elements from Y to Cd.
 (4) O^{2-} has the same no. of e⁻s in its outermost as well as penultimate shell

- Which of the following statement is not correct?
 (1) Tc and Pm are not found in nature
 (2) Element having $ns^2 np^5$ configuration are placed in the column before, the extreme right in the P.T.
 (3) Most of the man made element occurs in the actinoid series
 (4) The 3d - transition series contains elements having atomic number from 21 to 29
- Which of the following statement is not correct?
 (1) In the transition elements the incoming e⁻ occupy (n-1)d subshell in preference to np.
 (2) Elements having atomic number 57 to 71 belong to same group
 (3) Lanthanum is the first element of Lanthanoid series.
 (4) Actinium violates the Aufbau's principle
- Total number of elements of 6th period which have one or more than one 4d electrons :-
 (1) 10 (2) 16 (3) 32 (4) Zero
- Suppose an orbital may accommodate 3 electrons then the number of elements in IV period :-
 (1) 18 (2) 27 (3) 12 (4) 45
- Which of the following is not correctly matched?
 (1) $[\text{Xe}] 4f^{14} 5d^{10} 6s^2 \rightarrow$ Transition element
 (2) $[\text{Rn}] 5f^{14} 6d^1 7s^2 \rightarrow$ Inner transition element
 (3) $[\text{Xe}] 4f^{14} 5d^{10} 6s^2 6p^6 7s^2 \rightarrow$ Representative element
 (4) $[\text{Xe}] 4f^{14} 5d^2 6s^2 \rightarrow$ d-block element
- An element whose IUPAC name is ununtrium (Uut) belongs to :-
 (1) s-block (2) p-block
 (3) d-block (4) f-block
- Which of the following fact is not explainable by lanthanoid contraction ?
 (1) I.E. of Ag < Au (2) I.E._1 of Hg > Cd
 (3) Size of Hf $\approx$ Zr (4) Size of Y < La
- Which of the following property gradually increases from C to F ?
 (1) I.P (2) E.A.
 (3) Shielding Constant (4) All of these

16. Which of the following statement is not correct?

- (1) The first ionisation energies (in kJ mol^{-1}) of carbon, silicon, germanium, tin and lead are 1086, 786, 761, 708 and 715 respectively.
- (2) Down the group, electronegativity decreases regularly from B to Tl in boron family
- (3) Among oxides of the carbon family, CO is neutral, GeO_2 is acidic and SnO is amphoteric.
- (4) The 4f-and 5f-inner transition elements are placed separately at the bottom of the periodic table to maintain its structure.

17. Select the correct statements of the following:-

- (a) Effective nuclear charge for nitrogen is 3.90
- (b) IP of Ne is more than Na^+
- (c) Order of electronegativity- $sp > sp^2 > sp^3$
- (d) Order of acidic character- $\text{NH}_3 < \text{PH}_3 < \text{AsH}_3$
- (1) a, b, d
- (2) b, c
- (3) a, c, d
- (4) a, b, c, d

18.

		39	
	A		D
E		B	C

On the basis of given part of periodic table, incorrect statement is :

- (1) A is an alkaline earth metal
- (2) Atomic number of B is 103 which belongs to III B group
- (3) Atomic number, group no. and period number of D are 72, IVB and 6th respectively
- (4) C is a transuranic element

19. Which of the following statement is not correct ?

- (1) EN of nitrogen on pauling scale is 3.0 in all nitrogen compounds
- (2) The first I.E. for two isotopes of the same element has to be same
- (3) Removal of electron from orbitals bearing higher n value is easier. than from orbital having lower n value.
- (4) the size of isoelectric species is affected by nuclear charge (z)

20. Which statement is/are incorrect ?

- (1) In alkali metals in a group, from top to bottom increase in size is maximum from Na to K
- (2) Addition of e^- in P atom will be exothermic
- (3) IP of F is greater than its EA value
- (4) Reaction $\text{O}_{(g)}^- + \text{S}_{(g)} \rightarrow \text{O}_{(g)} + \text{S}_{(g)}^-$ is endothermic

21. If Z_{eff} of sodium is 'x' then Z_{eff} of calcium is :-

- (1) $x + 0.35$
- (2) $x + 0.65$
- (3) $x - 0.35$
- (4) $x - 0.65$

22. According to Slater's rule, the set of elements that shows incorrect order of Z_{eff} are :-

- (1) $\text{Al} > \text{Mg}$
- (2) $\text{Na} < \text{Al}$
- (3) $\text{K} > \text{Na}$
- (4) $\text{Sc} < \text{Ti}$

23. Lanthanoid contraction will not have any influence when we compare size of :-

- (1) Zr & Hf
- (2) Y & La
- (3) Mo & W
- (4) Tc & Re

24. In which one of the following pairs the radius of the second specie is greater than that of the first ?

- (1) $\text{O}^{2-}, \text{N}^{3-}$
- (2) Na, Mg
- (3) Al, Be
- (4) $\text{Li}^+, \text{Be}^{2+}$

25. Pair of smallest and largest species of radii among Mg, Al, Mg^{+2} , Al^{+3} is :-

- (1) Mg^{+2} , Mg
- (2) Al^{+3} , Mg
- (3) Mg^{+2} , Al
- (4) Al^{+3} , Al

26. The correct order of increasing order of size is:-

- (1) $\text{S} < \text{O} < \text{Se} < \text{C}$
- (2) $\text{O} < \text{C} < \text{S} < \text{Se}$
- (3) $\text{O} < \text{Se} < \text{S} < \text{C}$
- (4) $\text{C} < \text{O} < \text{S} < \text{Se}$

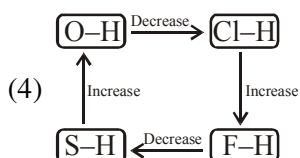
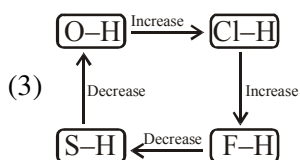
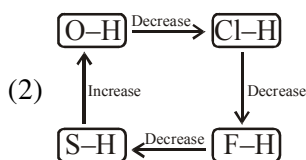
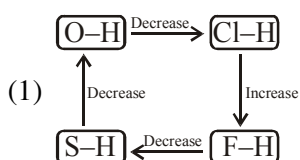
27. The order of basic character of given oxides is:-

- (1) $\text{Na}_2\text{O} > \text{MgO} > \text{Al}_2\text{O}_3 > \text{Cl}_2\text{O}_7$
- (2) $\text{MgO} > \text{Al}_2\text{O}_3 > \text{Cl}_2\text{O}_7 > \text{Na}_2\text{O}$
- (3) $\text{Al}_2\text{O}_3 > \text{MgO} > \text{Cl}_2\text{O}_7 > \text{Na}_2\text{O}$
- (4) $\text{Cl}_2\text{O}_7 > \text{Na}_2\text{O} > \text{MgO} > \text{Al}_2\text{O}_3$

28. Correct order of Ionic radii :-

- (1) $\text{Ti}^{4+} < \text{Mn}^{7+}$
- (2) $\text{Cr}^{+6} > \text{Cr}^{3+}$
- (3) $\text{K}^+ > \text{Cl}^-$
- (4) $\text{P}^{3+} > \text{P}^{5+}$

29. Which two are closest to one another in size ?
 (1) Li^+ and Na^+ (2) Be^{+2} and Mg^{+2}
 (3) Be^{+2} and Li^+ (4) Li^+ and Mg^{+2}
30. Which of the following ion has highest ionic radius?
 (1) Sc^{+3} (2) La^{+3} (3) Ce^{+3} (4) Lu^{+3}
31. Total number of elements of 5th period which have one or more than one 5d electrons :-
 (1) 10 (2) 16 (3) 30 (4) Zero
32. Total number of d electrons present in an element with atomic number 78 is :-
 (1) 8 (2) 58 (3) 29 (4) 38
33. How many g subshells will be required in case element Uuo is discovered ?
 (1) 1 (2) 2 (3) 3 (4) None
34. In which pair the first atom or ion is not larger than the second :-
 (1) N, F (2) Cl^- , Cl
 (3) O, S (4) Fe^{2+} , Fe^{3+}
35. Incorrect order of radius is :-
 (1) $\text{Sr}^{+2} < \text{Rb}^+ < \text{Br}^- < \text{Se}^{-2}$
 (2) $\text{Ni} > \text{Cu} > \text{Zn}$
 (3) $\text{Co} > \text{Co}^{+2} > \text{Co}^{+3} > \text{Co}^{+4}$
 (4) $\text{Ba}^{+2} < \text{Cs}^+ < \text{Se}^{-2} < \text{As}^{-3}$
36. Which of the following diagrams shows correct change in the polarity of bond ?

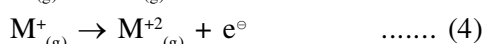


37. Correct order of size is :-
 (1) $\text{F} > \text{C} > \text{Br} > \text{Ge}$
 (2) $\text{Ge} > \text{C} > \text{F} > \text{Br}$
 (3) $\text{Ge} > \text{Br} > \text{C} > \text{F}$
 (4) $\text{Ge} > \text{C} > \text{Br} > \text{F}$
38. Which one of the following statements is incorrect ?
 (1) Greater the nuclear charge, greater is the electron gain enthalpy
 (2) Nitrogen has almost zero electron affinity
 (3) Electron gain enthalpy decreases from fluorine to iodine in the group
 (4) Chlorine has highest electron gain enthalpy
39. Which of the following properties among halogens decrease(s) from fluorine to iodine ?
 (1) Electronegativity (2) Bond energy
 (3) Ionisation energy (4) (1) & (3) both
40. Which of the following statements is incorrect ?
 (1) The second ionization energy of sulphur is greater than that of chlorine
 (2) The third ionization energy of phosphorus is greater than that of magnesium
 (3) The first ionization energy of aluminium is less than as that of gallium
 (4) The second ionization energy for boron is greater than that of carbon
41. The correct values of ionization enthalpies (in kJ mol^{-1}) of Si, P, Cl and S respectively are :-
 (1) 786, 1012, 999, 1256
 (2) 1012, 786, 999, 1256
 (3) 786, 1012, 1256, 999
 (4) 786, 999, 1012, 1256
42. Correct order of first ionisation energy is :-
 (1) $\text{C} > \text{N} > \text{O}$ (2) $\text{Mg} > \text{Al} > \text{P}$
 (3) $\text{Li} < \text{Be} < \text{N}$ (4) $\text{Tl} > \text{B} > \text{In}$
43. The second ionisation energy is maximum for :-
 (1) Boron (2) Beryllium
 (3) Magnesium (4) Aluminium
44. From the ground state, electronic configuration of the elements given below, pick up the one with highest value of second ionization energy :-
 (1) $1s^2 2s^2 2p^6 3s^2$ (2) $1s^2 2s^2 2p^6 3s^1$
 (3) $1s^2 2s^2 2p^6$ (4) $1s^2 2s^2 2p^5$

45. An element has successive ionization enthalpies as 940 (first), 2080, 3090, 4140, 7030, 7870, 16000 and 19500 kJ mol⁻¹. To which group of the periodic table does this element belong ?

- (1) 14 (2) 15 (3) 16 (4) 17

46. Consider the following changes :



The second ionization energy of $M_{(g)}$ could be calculated from the energy values associated with :

- (1) 1 + 3 + 4 (2) 2 - 1 + 3
(3) 1 + 5 - 3 (4) 5 - 3

47. Read the following statements:

(I) Atomic size of following pair are almost same

Fe, Co; Al, Ga ; Zr, Hf

(II) E.A. order of Li, Be, B, C, N, O is

Be < N < B < Li < C < O

(III) Ionisation energy of

Al < Ga & Zr < Hf

(IV) Ionic radius

$O^{2-} < F^- < Na^+ < Mg^{+2}$

Select the correct statements(s)

- (1) I, III, IV (2) I, II, III
(3) II, III, IV (4) All of the above

Passage (Q. No. 48 to 53) :

Ionization energies of five elements in kcal/mol are given below :

Atom	I	II	III
P	300	549	920
Q	99	734	1100
R	118	1091	1652
S	176	347	1848
T	497	947	1500

48. Which element is a noble gas ?

- (1) P (2) T (3) R (4) S

49. The element which form stable unipositive ion?

- (1) P (2) Q (3) T (4) S

50. The element which having most stable oxidation state +2 is ?

- (1) P (2) Q (3) R (4) S

51. Which is non-metal (excluding noble gas) ?

- (1) P (2) Q (3) S (4) T

52. If Q reacts with fluorine and oxygen, then molecular formula of fluoride and oxide will be respectively ?

- (1) QF_3 , Q_2O_3 (2) QF, Q_2O
(3) QF_2 , QO (4) None of these

53. Which of the following pair represents elements of same group ?

- (1) Q, R (2) P, Q (3) P, S (4) Q, S

54. The first ionisation energy of first atom is greater than that of second atom, whereas reverse order is true for their second ionisation energy. Which set of elements is not in accordance to above statement ?

- (1) C, B (2) P, S (3) B, Be (4) Mg, Na

55. Correct order by electron affinity for the following element is :-

- (1) $F > Cl > O > S$
(2) $Cl > F > S > O$
(3) $Cl > F > O > S$
(4) $F > Cl > S > O$

56. The first ionisation enthalpies of four consecutive elements present in the second period of the periodic table are 8.3, 11.3, 14.5 and 13.6 eV respectively. Which one of the following is the first ionisation enthalpy of nitrogen ?

- (1) 13.6 (2) 14.5 (3) 11.3 (4) 8.3

57. Which of the following Incorrect statements(s) among the following is/are ?

- (1) The first ionisation energy of calcium is more than first ionisation energy of Gallium
(2) The second ionisation energy of copper is greater than that of potassium
(3) The third ionisation energy of Mg is greater than the third ionisation energy of Al
(4) The IE_1 of Mg^+ is less than the IE_1 of Na^+

58. Find the incorrect second ionisation energy order from following option :-

- (1) $Al > Mg$ (2) $Te > Sb$
(3) $Fe > Fe^+$ (4) $In > Sr$

Element	I.E. _I	I.E. _{II}	ΔH_{eg}
P	520	7300	-60
Q	419	1051	-48
R	1681	3374	-328
S	1008	1846	-295
T	2372	5251	+48

Which of the following statement is not correct for above elements ?

- (1) P is the metal which form halide of the formula MX
(2) S is the less reactive non metal
(3) T is the least reactive element
(4) Q is a non-metal and does not form halide of the formula MX₂
60. If atomic number of an inert gas is Z then an element with which of the following atomic number will has highest I.E.
(1) Z - 2 (2) Z - 1
(3) Z + 1 (4) Z + 2
61. If I.E. of Na, Mg and Si are respectively 496, 737 and 786 kJ mol⁻¹ then I.E. of Al in KJ mol⁻¹ would be :-
(1) 575 (2) 760 (3) 390 (4) 1120
62. Correct order of metallic character is :-
(1) P < Si < Be < Mg < Na
(2) Si < P < Be < Na < Mg
(3) P < Si < Mg < Be < Na
(4) Si < P < Mg < Na < Be
63. Which one of the following statements is incorrect in relation to ionization enthalpy?
(1) Ionization enthalpy increases for the removing each successive electron.
(2) The greatest increase in ionization enthalpy is experienced on removal of electron from core noble gas configuration.
(3) End of valence electrons is marked by a big jump in ionization enthalpy.
(4) Removal of electron from orbitals bearing lower n value is easier than from orbital having higher n value.
64. IP₁, IP₂, IP₃, IP₄ and IP₅ for an element is 7.1, 14.3, 34.5, 46.8 and 162.2 eV respectively then element is :-
(1) Na (2) Si (3) F (4) Ca
65. Which process requires maximum energy ?
(1) Na(g) → Na⁺(g) + e⁻
(2) Al³⁺(g) → Al⁴⁺(g) + e⁻
(3) Al²⁺(g) → Al³⁺(g) + e⁻
(4) Na⁺(g) → Na²⁺(g) + e⁻
66. Amongst the following the incorrect order is :-
(1) IE₁(Al) < IE₁(Mg) (2) IE₁(Na) < IE₁(Mg)
(3) IE₂(Mg) > IE₂(Na) (4) IE₃(Mg) > IE₃(Al)
67. Which of the following statement is correct ?
(1) Number of e⁻ in (n-1)th shell of f block element are (0-1)
(2) 6th period contains 10 elements which have one or more 6d electrons
(3) In the 8th period, subshell used will be 8s, 5g, 6f, 7d, 8p
(4) 1 and 3 both
68. The increasing order of electron affinity of the electronic configurations of element is :-
(I) 1s²2s²2p⁶3s²3p⁵ (II) 1s²2s²2p³
(III) 1s²2s²2p⁵ (IV) 1s²2s²2p⁶3s¹
(1) II < IV < III < I (2) I < II < III < IV
(3) I < III < II < IV (4) IV < III < II < I
69. The element having very high ionization enthalpy but zero electron affinity is :-
(1) H (2) F (3) He (4) Be
70. Which of the following statement is correct regarding following process ?
(i) Cl $\xrightarrow{\text{E.A.}}$ Cl⁻ (ii) Cl⁻ $\xrightarrow{\text{I.E.}}$ Cl
(iii) Cl $\xrightarrow{\text{I.E.}}$ Cl⁺ (iv) Cl⁺ $\xrightarrow{\text{I.E.}}$ Cl²⁺
(1) I.E. of process (ii) = | E.A. of process (i) |
(2) I.E. of process (iii) = | I.E. of process (ii) |
(3) I.E. of process (iv) = | E.A. of process (i) |
(4) I.E. of process (iv) = | I.E. of process (iii) |
71. Which of the following statements is/are correct ?
(1) Van der Waals' radius of iodine is more than its covalent radius.
(2) All isoelectronic ions of corresponding elements belong to the same period of the periodic table
(3) The electron affinity of fluorine is greater than that of chlorine.
(4) IE₂ of N-atom is higher than that of O-atom

72. Which one is least basic ?
 (1) $\text{Tb}(\text{OH})_3$ (2) $\text{Yb}(\text{OH})_3$
 (3) $\text{Gd}(\text{OH})_3$ (4) $\text{Eu}(\text{OH})_3$
73. Highest electron affinity observe in :-
 (1) $2s^2 2p^5$ (2) $2s^2 2p^4$
 (3) $2s^2 2p^3$ (4) $2s^2 2p^1$
74. Electron affinity of :
 (1) carbon is greater than oxygen
 (2) sulphur is lesser than oxygen
 (3) iodine is higher than bromine
 (4) bromine is lesser than chlorine
75. Which of the following EA order is not correct
 (1) $\text{N} < \text{O} < \text{S}$ (2) $\text{Cl} > \text{O} > \text{N} > \text{C}$
 (3) $\text{Ne} < \text{P} < \text{Si} < \text{S}$ (4) $\text{B} < \text{C} < \text{Si} < \text{S}$
76. The value of $\Delta_{\text{eg}} H$ of N & Ne respectively in KJ/mole :-
 (1) +580, +780 (2) +780, +580
 (3) +580, -780 (4) -780, -580
77. I.P is maximum for :-
 (1) Li^+ (2) Ne (3) Be (4) B
78. Select the incorrect statements :
 (1) Size of H^- is larger than F^-
 (2) Rb is more electropositive compared to Ca
 (3) Na^+ is more electronegative than the Na
 (4) Cl^- is more electronegative than that of F
79. Which is/are correct about electronegativity order of the following elements ?
 (1) $\text{P} > \text{Si}$ (2) $\text{C} > \text{N}$ (3) $\text{C} > \text{Br}$ (4) $\text{Sr} > \text{Ca}$
80. Select the incorrect statement(s) :
 (1) In general more the ionisation energy more will be electronegativity
 (2) Electronegativity increases means metallic character increases
 (3) In general lower will be the ionisation energy, higher will be reducing property
 (4) Cl has higher electron affinity than F
81. Pauling's electronegativity scale is based on experimental value of:-
 (1) atomic radii (2) bond energy
 (3) bond length (4) electron affinity
82. An atom with high electronegativity generally has:-
 (1) tendency to form +ve ions
 (2) high ionisation potential
 (3) large atomic size
 (4) low electron affinity
83. Which order is correct ?
 (1) $\text{N} < \text{O}$ (IP_2)
 (2) $\text{O} > \text{N}$ (IP_1)
 (3) $\text{Zn} < \text{Mn}$ (IP_1)
 (4) $\text{Al} > \text{B}$ (IP_1)
84. p block elements of 6th period are represented as :-
 (1) $[\text{Xe}] 4f^{14} 5d^{10} 6p^{1-6}$
 (2) $[\text{Xe}] 5f^{14} 6d^{10} 6p^{1-6}$
 (3) $[\text{Kr}] 5f^{14} 5d^{10} 6p^{1-6}$
 (4) $[\text{Xe}] 4f^0 5d^{10} 6p^{1-6}$
85. Correct atomic size is :-
 (1) $\text{Li} > \text{I} > \text{F} < \text{Cl} < \text{Br}$
 (2) $\text{I} > \text{Li} > \text{F} < \text{Cl} > \text{Br}$
 (3) $\text{I} > \text{Br} > \text{Cl} > \text{F} > \text{Li}$
 (4) $\text{Li} > \text{F} < \text{I} < \text{Br}$
86. Which of the following valence electron experiences maximum effective nuclear charge?
 (1) $4s^1$ (2) $4p^1$ (3) $3d^1$ (4) $2p^3$
87. Incorrect order of IP is :-
 (1) $\text{Cu}^+ > \text{Zn}^+$
 (2) $\text{Cu} < \text{Zn}$
 (3) $\text{Tl} < \text{Al}$
 (4) $\text{Pd} > \text{Ag}$
88. Lowest 1st IP is of :-
 (1) Pb (2) Si (3) Sn (4) C
89. Which of following radius order is not correct?
 (1) $\text{Ti} < \text{Zr} \approx \text{Hf}$
 (2) $\text{Sc} < \text{Y} \approx \text{La}$
 (3) $\text{B} < \text{Al} \approx \text{Ga} < \text{In} \approx \text{Tl}$
 (4) $\text{O} < \text{N} < \text{S} < \text{P}$
90. Correct order of EA is :-
 (1) $\text{Cl} > \text{O} > \text{N} > \text{C}$
 (2) $\text{Cl} > \text{O} > \text{C} > \text{N}$
 (3) $\text{Cl} > \text{N} > \text{C} > \text{O}$
 (4) $\text{Cl} > \text{C} > \text{O} > \text{N}$

MATCH THE COLUMN TYPE QUESTIONS

91.	Column I	Column II
(A)	$Z = 102$	(P) s-block
(B)	$Z = 120$	(Q) d-block
(C)	$Z = 107$	(R) f-block
(D)	$Z = 82$	(S) p-block

92.

Column I	Column II
(A) $1s^2 2s^2 2p^6 3s^1 3p^3 3d^2$	(P) s-block, II A, 2nd Pd
(B) $[Rn] 6d^2 7s^2$	(Q) d-block, II B, 4 th Pd.
(C) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$	(R) f-block III B, 7 th Pd
(D) $1s^2 2s^1 2p^1$	(S) p-block VI A, 3rd Pd

93.

Column-I (Characteristic involve in the given process of Column-II)	Column-II (Process described)
(A) Energy released	(P) $S \longrightarrow S^-$
(B) Energy absorbed	(Q) $O^- \longrightarrow O^{2-}$
(C) Inert gas configuration is achieved	(R) $Sr \longrightarrow Sr^{2+}$
(D) Half filled configuration is achieved	(S) $N^- \longrightarrow N$
	(T) $Ge \longrightarrow Ge^-$

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans	3	4	3	1	2	2	4	4	3	3
Que.	11	12	13	14	15	16	17	18	19	20
Ans	2	1	2	4	3	2	3	2	1	4
Que.	21	22	23	24	25	26	27	28	29	30
Ans	2	3	2	1	2	2	1	4	4	2
Que.	31	32	33	34	35	36	37	38	39	40
Ans	4	3	4	3	2	4	3	3	4	2
Que.	41	42	43	44	45	46	47	48	49	50
Ans	3	3	1	2	3	4	2	2	2	4
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	1	2	1	3	2	2	2	3	4	2
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	1	1	4	2	2	3	3	1	3	1
Que.	71	72	73	74	75	76	77	78	79	80
Ans.	1	2	1	4	2	1	1	4	1	2
Que.	81	82	83	84	85	86	87	88	89	90
Ans.	2	2	1	1	1	4	3	3	2	2
Que.	91			92			93			
Ans.	A-R; B-P; C-Q; D-S			A-S; B-R; C-Q; D-P			A-P,S,T; B-Q,R; C-Q,R; D-S,T			

CHEMICAL BONDING

- Which of the following pair of species are iso structural ?
 (1) ICl_2^- & I_3^+ (2) NO_2 & CO_2
 (3) XeF_4 , ICl_4^- (4) SO_3^{2-} , ClO_4^-
- When iodine is dissolved in aqueous potassium iodide KI_3 is formed the shape of the Anionic part :-
 (1) Linear (2) Angular
 (3) Triangular (4) See-Saw
- Which of the following pairs of species have largest difference in spin only magnetic moment ?
 (1) O_2 , O_2^+ (2) O_2 , O_2^{2-}
 (3) O_2^+ , O_2^{2-} (4) O_2^- , O_2^+
- Which of the following statements is not correct from the point of view of molecular orbital theory ?
 (1) Be_2 is not a stable molecule
 (2) He_2 is not stable but He_2^+ is expected to exist
 (3) Bond strength of N_2 is maximum amongst the homonuclear diatomic molecules
 (4) The order of energies of molecular orbitals in F_2 molecule is $\pi_{2p_x} = \pi_{2p_y} < \sigma_{2p_z}$
- Two hybrid orbitals have a bond angle of 120° . The percentage of p-character in the hybrid orbital is nearly:-
 (1) 25% (2) 33% (3) 50% (4) 66%
- In $\text{ICl}_4^\ominus$, shape is square planar. The number of bond pair – lone pair repulsion at 90° are:-
 (1) 6 (2) 4 (3) 12 (4) 8
- Which of the following set of molecules have same shape but different hybridisation ?
 (1) XeO_4 , SF_4 (2) XeO_3 , BrF_3
 (3) H_2O , SnCl_2 (4) I_3^- , I_3^+
- Which of the following compound gives paramagnetic gas on heating ?
 (1) LiNO_3 (2) NaNO_3
 (3) KNO_3 (4) All of these
- Which of the following can not be explained on the basis of polarisation ?
 (1) Ag_2S is less soluble than Ag_2O
 (2) BeCO_3 is thermally less stable than BaCO_3
 (3) BaCO_3 is less soluble than MgCO_3
 (4) Melting point of AlCl_3 is less than that of NaCl .
- Which of the following order of Bond strength is not correct ?
 (1) Diamond < Graphite (C–C bond)
 (2) $\text{SO}_2 > \text{SO}_3^{2-} > \text{SO}_4^{2-}$ (S–O bond)
 (3) $\text{CO}_3^{2-} < \text{HCO}_2^-$ (C–O bond)
 (4) $\text{O}_2^- < \text{O}_2 < \text{O}_2^+$ (O–O bond)
- A molecule XY_2 contains two σ , two π bond and one lone pair of electron in the valence shell of X. The arrangement of lone pair as well as bond pair is :
 (1) Square pyramidal
 (2) Linear
 (3) Trigonal planar
 (4) Unpredictable
- The molecule which contain σ bonds, π bonds and lone pairs in 1 : 1 : 1 ratio :-
 (1) C_2N_2 (Cyanogen)
 (2) C_6H_6 (Benzene)
 (3) $\text{C}(\text{CN})_4$ (Tetracyano methane)
 (4) C_3O_2 (Carbon suboxide)
- In CO_2 , SO_2 , SiO_2 each central atom is covalently bonded with :-
 (1) 2,2,4 oxygen atoms respectively
 (2) 2,2,2 oxygen atoms respectively
 (3) 2,4,4 oxygen atoms respectively
 (4) 4,4,4 oxygen atoms respectively
- The incorrect order of bond angle :-
 (1) $\text{CO}_2 > \text{CO}_3^{2-} > \text{CF}_2\text{Cl}_2$
 (2) $\text{NO}_2^+ > \text{NO}_3^- > \text{NO}_2^-$
 (3) $\text{XeF}_2 > \text{XeO}_3 > \text{XeO}_4$
 (4) $\text{PH}_3 > \text{AsH}_3 > \text{SbH}_3$

15. Which of following statement is incorrect ?
 (1) Boiling point of H_2O_2 is greater than that of H_2O .
 (2) Ethylene glycol is less viscous than glycerol.
 (3) o-nitrophenol can be separated from its meta and para isomer, using its order of volatile property.
 (4) In ice, each 'O' atom is tetrahedrally arranged by four H-atom which are all in the equal distance.
16. Which of the following combination of orbitals is correct ?
 (1) 
 (2) 
 (3) 
 (4) 
17. Which of the following statements is not correct regarding bonding molecular orbital ?
 (1) Bonding molecular orbitals possess less energy than the atomic orbitals from which they are formed.
 (2) Bonding molecular orbitals have low electron density between the two nucleus
 (3) Every electron in bonding molecular orbitals contributes to the attraction between atoms
 (4) They are formed when the lobes of the combining atomic orbitals have same sign
18. Which of the following statement is correct. As the %s- character of a hybrid orbital decreases?
 (1) The bond angle decreases
 (2) The bond strength increases
 (3) The bond length decreases
 (4) Size of orbital decreases
19. Which of the following molecule has two lone pairs and bond angle $< 109^\circ 28'$?
 (1) SF_2 (2) KrF_4
 (3) ICl_4^- (4) All of these
20. Which of the following does not contain PX_4^+ type cation in solid phase ?
 (X=halogen atom)
 (1) PF_5 (2) PCl_5
 (3) PBr_5 (4) None of these
21. Incorrect order of bond angle is :-
 (1) $\text{NH}_3 > \text{PH}_3 > \text{AsH}_3$
 (2) $\text{H}_2\text{O} > \text{H}_2\text{S} > \text{H}_2\text{Se}$
 (3) $\text{BCl}_3 > \text{AlCl}_3 > \text{GaCl}_3$
 (4) $\text{NO}_2^+ > \text{NO}_2 > \text{NO}_2^-$
22. In which of the following molecule 2π and $\frac{1}{2}\sigma$ bond is present ?
 (1) O_2^{-1} (2) O_2^+ (3) N_2^{-1} (4) N_2^{+1}
23. Order $\text{H}_3\text{PO}_4 > \text{H}_2\text{SO}_4 > \text{HNO}_3 > \text{HCl}$ is correct for :-
 (1) Acidic nature (2) Basic strength
 (3) Viscosity (4) Oxidation state
24. In which of the following compound all the bond angles are equal :-
 (1) SF_4 (2) CCl_4 (3) CHCl_3 (4) XeF_6
25. Correct order of Bond angle is
 (1) $\text{NO}_2^+ < \text{NO}_2 < \text{NO}_2^-$
 (2) $\text{BeCl}_2 > \text{BF}_3 < \text{CF}_4$
 (3) $\text{NH}_4^+ > \text{NH}_3 > \text{NH}_2^-$
 (4) $\text{OF}_2 > \text{OCl}_2 > \text{OBr}_2$
26. Which of the following do not exhibit resonance ?
 (1) CO_3^{-2} (2) ClO_3^- (3) SiO_2 (4) SO_3^{-2}
27. The incorrect statement regarding chloral hydrate $\text{CCl}_3\text{CH}(\text{OH})_2$ is :-
 (1) It exhibits intramolecular hydrogen bonding
 (2) It has 9 lone pair and 9 bond pair
 (3) It is stable inspite of coexistence of two-OH groups on a carbon atom
 (4) Compound is non-planar and polar
28. Which of the following statements is incorrect?
 (1) ClF_3 has T-shape
 (2) In SF_6 , F-S-F equatorial bond angle is less than 120°
 (3) In $[\text{ICl}_4]^-$, Cl-I-Cl bond angle is 109°
 (4) Shape of XeF_2 molecule is linear

29. Identify the correct option :-
 (1) $\text{NO}_3^- > \text{NH}_3 > \text{NH}_2^-$ (order of bond angle)
 (2) $(\text{CH}_3)_3\text{B}$ is a planar molecule
 (3) In NH_4Cl , 'N' atom is in sp^3d Hybridisation
 (4) $\text{BF}_3 < \text{BCl}_3 < \text{BBr}_3 < \text{BI}_3$ (Order of bond angle)
30. Which of the following is not correctly match between given species and type of overlapping ?
 (1) XeO_3 : Three ($\text{d}\pi\text{-p}\pi$) bonds
 (2) H_2SO_4 : Two ($\text{d}\pi\text{-p}\pi$) bonds
 (3) SO_3 : Three ($\text{d}\pi\text{-p}\pi$) bonds
 (4) HClO_4 : Three ($\text{d}\pi\text{-p}\pi$) bonds
31. In which of the following molecules no. of lonepairs and bond pairs on central atom are not equal ?
 (1) H_2O (2) I_3^- (3) O_2F_2 (4) SCl_2
32. Number of carbon atom present linearly in C_3O_2 :-
 (1) 2 (2) 3 (3) 6 (4) 1
33. In which pair both are not isostructural ?
 (1) BH_4^- & AlH_4^- (2) NH_4^+ & PH_4^+
 (3) PCl_6^- & $[\text{SiF}_6]^{2-}$ (4) BCl_4^- & ICl_4^-
34. In which of the following molecule all bond length are equal ?
 (1) SF_4 (2) B_2H_6 (3) PCl_5 (4) SiF_4
35. Which of the following set do not have sp^3d hybridization ?
 (1) PF_4^- & BrF_3 (2) ICl_2^+ & SF_4
 (3) XeF_2 & I_3^- (4) AsF_4^- & SCl_4
36. Which of the following has different hybridization than other ?
 (1) I_3^- (2) XeO_3 (3) SeCl_4 (4) AsF_4^-
37. Which of the following molecule exhibit $\text{P}_\pi\text{-P}_\pi$ bonding ?
 (1) CO_3^{2-} (2) NO_3^-
 (3) SiO_2 (4) (1) & (2) both
38. Which of the following statement is not correct ?
 (1) PCl_3F_2 has zero dipole moment
 (2) PH_4^+ is having tetrahedral geometry with sp^3 hybridisation of central atom.
 (3) All diatomic molecules with polar bonds have dipole moment.
 (4) Four half filled pure orbital of carbon form same kind of bonds in CH_4
39. Select in which both have sea-saw shape :-
 (1) XeO_2F_2 , SiF_4
 (2) XeO_2F_2 , IO_2F_2^-
 (3) TeCl_4 , ICl_4^-
 (4) BrO_3F , XeOF_2
40. Which of the following have same geometry ?
 (1) SbF_5^{2-} , XeF_5^- , IF_5
 (2) SF_4 , XeOF_4 , PCl_4^+
 (3) SF_6 , PF_6^- , IOF_5
 (4) COCl_2 , SOCl_2 , XeOF_2
41. In which hybridisation, all orbitals are NOT equivalent ?
 (1) sp^3 (2) sp^3d
 (3) sp^3d^2 (4) sp^2
42. Out of CHCl_3 , CH_4 and SF_4 , the molecule are not having regular geometry are :-
 (1) CHCl_3 only
 (2) CHCl_3 & SF_4
 (3) CH_4 only
 (4) CH_4 & SF_4
43. The correct order of increasing %s-character in the hybrid orbitals of following molecule/ion is :-
 (I) CO_3^{2-} (II) XeF_4 (III) I_3^-
 (IV) NCl_3 (V) BeCl_2
 (1) $\text{II} < \text{III} < \text{IV} < \text{I} < \text{V}$
 (2) $\text{II} < \text{IV} < \text{III} < \text{V} < \text{I}$
 (3) $\text{III} < \text{II} < \text{I} < \text{V} < \text{IV}$
 (4) $\text{II} < \text{IV} < \text{III} < \text{I} < \text{V}$
44. Which of the following will have pyramidal shape ?
 (1) XeO_3 (2) ICl_4^-
 (3) ICl_2^- (4) All of these
45. Which of the following is electron deficient compound ?
 (1) PF_3 (2) ClF_3
 (3) AlF_3 (4) BF_3
46. Maximum number of identical bond lengths are present in :-
 (1) SF_6 (2) IF_7
 (3) PCl_5 (4) SO_4^{2-}

47. Match column-I with column-II and select the correct answer :-

Column-I (Molecules)		Column-II (Property)	
P	IF ₇	1	Planar and polar
Q	SO ₂	2	Non planar and polar
R	SF ₄	3	planar and nonpolar
S	CS ₂	4	Non planar and nonpolar

- (1) (P) → (4) ; (Q) → (1) ; (R) → (2) ; (S) → (3)
 (2) (P) → (4) ; (Q) → (2) ; (R) → (1) ; (S) → (3)
 (3) (P) → (3) ; (Q) → (1) ; (R) → (2) ; (S) → (4)
 (4) (P) → (3) ; (Q) → (1) ; (R) → (4) ; (S) → (2)

48. In which type of molecule, the dipole moment will be nonzero ?

Where B is Bond pair
 L is Lone pair
 A is Central atom

- (1) AB₂L₂ (2) AB₂L₃ (3) AB₄L₂ (4) AB₄

49. Which of the following compounds give paramagnetic gas on decomposition ?

- (i) Pb(NO₃)₂ (ii) LiNO₃
 (iii) NaNO₃ (iv) NH₄NO₂
 (1) I, II, III (2) II, III
 (3) I, II (4) III, IV

50. Arrange the following compound in order of increasing dipole moment :-

- (I) 1, 3, 5-Trichloro benzene
 (II) 1, 2, 4-Trichloro benzene
 (III) 1, 2, 3, 4-Tetrachloro benzene
 (IV) P-dichloro benzene

- (1) I = IV < II < III
 (2) IV < I < II < III
 (3) IV = I < III < II
 (4) IV < II < I < III

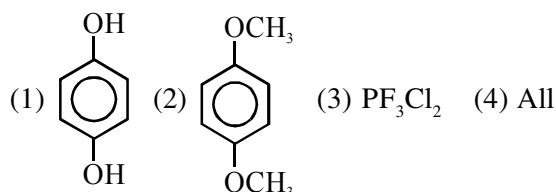
51. Which of the following molecule is planar as well as polar ?

- (1) PCl₃ (2) SF₄
 (3) CCl₄ (4) None of these

52. Which of the following compound have number of pπ-pπ bond equal to pπ-dπ bond ?

- (1) SO₃ (2) SO₂
 (3) SOCl₂ (4) SO₂Cl₂

53. Which of the following molecule has some dipole moment ?



54. Which of the following species is non polar with presence of polar bond and lone pair of electron on central atom ?

- (1) CO₂ (2) SF₄
 (3) XeF₄ (4) CF₄

55. Which of the following species are Hypovalent ?

- (I) CℓO₄⁻ (II) BF₃
 (III) SO₄⁻² (IV) CO₃⁻²
 (1) I, II, III (2) Only II
 (3) II, IV (4) I, III, IV

56. Bond Bond dissociation energy (kJ mole⁻¹)

- C-I 240 → Element A
 C-II 328 → Element B
 C-III 276 → Element C
 C-IV 485 → Element D

Elements A, B, C and D, which element has the smallest atom ?

- (1) I (2) III (3) II (4) IV

57. Which have maximum number of lone pair on central atom ?

- (1) SO₂ (2) SCl₂
 (3) XeF₂ (4) XeO₂F₂

58. Identify the wrong statement :-

- (1) Generally a sigma bond has free rotation along the axis
 (2) p-orbitals always have only sideways overlapping
 (3) s-orbital never form π-bond
 (4) There can not be more than one sigma bond between two atoms

59. Which of the following statement is incorrect :-
 (1) Both CO_2 and SiO_2 are linear
 (2) If internuclear axis is Z-axis then p_z orbital overlaps to form σ bond
 (3) The average formal charge on each 'O' atom in ClO_4^- is $-1/4$.
 (4) $3d_{xy} - 2p_x$ colateral overlapping is stronger than $3p_x - 3p_x$ sideway overlapping
60. If compound AX_3 is a hypervalent compound then the group no of element A is :-
 (1) III A (2) V A (3) VI A (4) VII A
61. Correct order of extent of overlapping is :-
 (1) $2s - 2s > 2p - 2p > 2s - 2p$
 (2) $1s - 1s > 2p - 2p > 2s - 2p$
 (3) $1s - 1s < 2s - 2s < 3s - 3s$
 (4) $3s - 3s > 3s - 3p > 3p - 3p$
62. Which one is formed in II^{nd} excited state ?
 (1) PCl_5 (2) SH_6
 (3) SO_3 (4) IF_7
63. When two same A.O. combine they form B.M.O. & A.B.M.O. During B.M.O. 'x' energy is released & during A.B.M.O. 'y' energy is absorbed. So the correct relation for bond formation will be ?
 (1) $x = y$
 (2) $x < y$
 (3) $y < x$
 (4) None of these
64. Dative Bond is present in :-
 (1) CsBr_3 (2) KNO_2
 (3) KHF_2 (4) All
65. Which of the following element never form compound in ground state :-
 (1) N (2) B (3) C (4) P
66. Which of the following pair have same hybridisation :-
 (1) ClO_4^- & ClO_2^- (2) SF_4 & CCl_4
 (3) BF_3 & NF_3 (4) CO_2 & SO_2
67. Which orbital is not involved in the formation of PCl_5 molecule :-
 (1) s (2) d_{z^2} (3) $d_{x^2-y^2}$ (4) p_z
68. Shape of molecule having 4-bond pair and one lone pair is :-
 (1) Trigonal bipyramidal
 (2) T-Shape
 (3) See-saw
 (4) Square planar
69. Which of the following molecules has both $p\pi - p\pi$ and $p\pi - d\pi$ bonds ?
 (1) XeO_2F_2 (2) SO_2Cl_2
 (3) SO_3 (4) XeO_3
70. Select the correct statement :
 (1) The order of (C-O) B.O. in various species $\text{CO}_3^{2-} < \text{CO}_2 < \text{CO}$
 (2) PH_5 can undergo sp^3d hybridisation to have octahedral geometry
 (3) Dipole moment of CH_3F is greater than of CH_3Cl
 (4) Increasing strength of hydrogen bonding is $\text{Cl}-\text{H} \cdots \text{Cl} < \text{O}-\text{H} \cdots \text{N} < \text{N}-\text{H} \cdots \text{N} < \text{F}-\text{H} \cdots \text{F}$
71. Species present in acidic aq. solution are :-
 (1) H_3O^+ (2) H_5O_2^+
 (3) H_7O_3^+ (4) All
72. Intramolecular hydrogen bonding is not present in :-
 (1) Urea (2) Chloral hydrate
 (3) Salicylaldehyde (4) o-fluoro phenol
73. Which of the following order of H-bond strength is not correct ?
 (1) $\text{HF} > \text{H}_2\text{O} > \text{NH}_3 > \text{H}_2\text{S}$
 (2) $\text{D}_2\text{O} > \text{H}_2\text{O}$
 (3) $\text{H}_2\text{O} > \text{H}_2\text{O}_2$
 (4) $\text{HF}_2^- < (\text{HF})_2$
74. Dipole-dipole (Keesom) attraction is present in :-
 (1) $\text{KCl} + \text{H}_2\text{O}$
 (2) $\text{CH}_3-\text{C}(=\text{O})-\text{CH}_3 + \text{CH}_3-\text{C}\equiv\text{N}$
 (3) $\text{NO}_3^- + \text{Cl}_2$
 (4) $\text{HCl} + \text{Cl}_2$
75. The solubility of inert gases in water is due to:-
 (1) Keesom attraction (2) Debye attraction
 (3) London force (4) Ion-dipole attraction

76. Dispersion force is present between :-
 (1) Polar + Polar molecules
 (2) Nonpolar + Non-polar molecules
 (3) Polar + Nonpolar molecules
 (4) All of these
77. Stability of the species Li_2 , Li_2^- and Li_2^+ increases in the order of :-
 (1) $\text{Li}_2^- < \text{Li}_2^+ < \text{Li}_2$ (2) $\text{Li}_2 < \text{Li}_2^+ < \text{Li}_2^-$
 (3) $\text{Li}_2 < \text{Li}_2^- < \text{Li}_2^+$ (4) $\text{Li}_2^- < \text{Li}_2 < \text{Li}_2^+$
78. Which of the following compound doesnot exist?
 (1) PCl_5 (2) OF_6 (3) OF_2 (4) BrF_5
79. Among the following, VWF are maximum in :-
 (1) HBr (2) LiBr (3) LiCl (4) AgBr
80. Which of the following can not be calculated by Born Haber cycle in the formation of MgO ?
 (1) Lattice energy of MgO
 (2) EA of oxygen
 (3) Hydration energy of Mg^{+2}
 (4) I.E. of Mg
81. Which pair is not isomorphous pair ?
 (1) Green vitriol, Epsom salt
 (2) KNO_3 , CaCO_3
 (3) NaF , Na_2O
 (4) Potash alum, chrome alum
82. How many compounds show conductivity ?
 HCl(aq) , AlCl_3 (molten), AlF_3 (molten), Graphite, Na(s) , $\text{AlCl}_3(\text{aq})$
 (1) 4 (2) 5 (3) 6 (4) 3
83. In which of the following set do all the three compounds have bonds that are mainly ionic?
 (1) NaCl , NCl_3 , CCl_4 (2) CsBr , BaBr_2 , SrO
 (3) CsF , BF_3 , NH_3 (4) Al_2O_3 , CaO , SO_2
84. Which of the following B.P. order is not correct?
 (1) $\text{SiF}_4 < \text{SiCl}_4$ (2) $\text{CH}_4 < \text{SiH}_4 < \text{GeH}_4$
 (3) $\text{CH}_4 < \text{CD}_4$ (4) $\text{He} > \text{Xe}$
85. Which of the following order is not correct ?
 (1) $\text{H}_2\text{O} > \text{NH}_3$ (melting point)
 (2) $\text{CH}_3\text{--O--CH}_3 < \text{C}_2\text{H}_5\text{--OH}$ (boiling point)
 (3) $(\text{CH}_3)_2\text{SO}_4 > \text{H}_2\text{SO}_4$ (volatility)
 (4) $\text{HCl} > \text{HF}$ (Boiling point)
86. In which of the following process, weaking of covalent bond take place :-
 (1) Boiling of H_2O (2) Melting of KCN
 (3) Boiling of CF_4 (4) Melting of SiO_2
87. Find the total number of molecule / ions in which d orbitals is / are not in hybridisation :-
 $\text{PCl}_6^-, \text{PCl}_4^+, \text{IF}_4^-, \text{IF}_5, \text{XeO}_3\text{F}_2, \text{ICl}_2^+, \text{SF}_2, \text{SF}_6, \text{AsF}_4^+, \text{SiF}_4$
 (1) 3 (2) 4 (3) 5 (4) 6
88. Number of molecules or ions which has/have any bond angle of 120° is :-
 $\text{CH}_3^-, \text{CH}_3^+, \text{NH}_3, \text{CO}_3^{2-}, \text{BCl}_3, \text{PCl}_3$
 (1) 3 (2) 4 (3) 5 (4) 6
89. The species having diamagnetic nature and bond order 1.0 is :-
 (1) O_2^{2-} (2) O_2^+ (3) O_2^{2+} (4) O_2
90. Which specie doesn't exist ?
 (1) B_2 (2) Be_2 (3) Li_2 (4) H_2^+
91. Which of the following order is incorrect ?
 (1) $\text{MCl} < \text{MCl}_2 < \text{MCl}_3$; Ionic character
 (2) $\text{F}^- < \text{Cl}^- < \text{Br}^- < \text{I}^-$; Polarisability
 (3) $\text{Na}^+ < \text{Ca}^{+2} < \text{Mg}^{+2} < \text{Al}^{+3}$; Polarising power
 (4) $\text{LiF} < \text{LiCl} < \text{LiBr} < \text{LiI}$; Covalent character
92. Which is the correct decreasing order of covalent nature ?
 (1) $\text{SiCl}_4 > \text{AlCl}_3 > \text{ZnCl}_2 > \text{CaCl}_2 > \text{MgCl}_2$
 (2) $\text{SiCl}_4 > \text{AlCl}_3 > \text{MgCl}_2 > \text{CaCl}_2 > \text{ZnCl}_2$
 (3) $\text{ZnCl}_2 > \text{SiCl}_4 > \text{AlCl}_3 > \text{MgCl}_2 > \text{CaCl}_2$
 (4) $\text{SiCl}_4 > \text{AlCl}_3 > \text{ZnCl}_2 > \text{MgCl}_2 > \text{CaCl}_2$
93. Which of the following order is not correct ?
 (1) $\text{CrO} < \text{Cr}_2\text{O}_3 < \text{CrO}_3$ (covalent character)
 (2) $\text{ZnO(Philosopher's wool)} > \text{ZnS(Zinc blend)}$ (ionic character)
 (3) $\text{BeCl}_2 > \text{MgCl}_2 > \text{CaCl}_2 > \text{SrCl}_2 > \text{BaCl}_2$ (ionic character)
 (4) $\text{KCl} < \text{AgCl}$ (covalent character)

94. Which of following will not conduct electricity?
(1) KOH (aq.) (2) Fused NaCl
(3) Solid KCl (4) Graphite
95. Which of the following statement is not correct ?
(1) Ortho nitro phenol can be separated from its meta and para isomer using its steam volatile property.
(2) HF(s) has zig-zag structure
(3) HF is more volatile than HCl.
(4) Ethylene glycol is less viscous than glycerol.
96. Which of the following solubility order is not correct ?
(1) $\text{MgF}_2 < \text{MgCl}_2 < \text{MgBr}_2 < \text{MgI}_2$
(2) $\text{Be}(\text{OH})_2 < \text{Mg}(\text{OH})_2 < \text{Ca}(\text{OH})_2 < \text{Sr}(\text{OH})_2$
(3) $\text{Li}_2\text{O} < \text{Na}_2\text{O} < \text{K}_2\text{O} < \text{Rb}_2\text{O} < \text{Cs}_2\text{O}$
(4) $\text{CsF} < \text{CsCl} < \text{CsBr} < \text{CsI}$
97. If Hund's rule is not applicable then which of the following species is paramagnetic ?
(1) B_2 (2) N_2
(3) O_2^{1-} (4) O_2
98. The salt having least solubility in water :-
(1) CaSO_4 (2) BeSO_4
(3) MgSO_4 (4) BaSO_4
99. The fluoride which is most soluble in water :-
(1) CaF_2 (2) BaF_2 (3) SrF_2 (4) BeF_2
100. Which of the following compound will release brown color gas on heating ?
(1) CaCO_3 (2) NaNO_3
(3) $\text{Zn}(\text{NO}_3)_2$ (4) NaHCO_3
101. Which of the following statement is incorrect?
(1) $\text{AgCl} < \text{AgF}$ (solubility in H_2O)
(2) $\text{KCl} < \text{KI}$ (solubility in acetone)
(3) $\text{BeC}_2\text{O}_4 < \text{BaC}_2\text{O}_4$ (solubility in H_2O)
(4) $\text{CaCrO}_4 > \text{BaCrO}_4$ (solubility in H_2O)
102. Correct solubility order :-
(1) $\text{CaCrO}_4 > \text{BaCrO}_4$ (2) $\text{BeCO}_3 < \text{BaCO}_3$
(3) $\text{LiNO}_3 < \text{CsNO}_3$ (4) $\text{NaClO}_4 < \text{KClO}_4$
103. Which of the following halide can be converted into anhydrous form on heating ?
(1) $\text{BeCl}_2 \cdot \text{H}_2\text{O}$ (2) $\text{KCl} \cdot 6\text{H}_2\text{O}$
(3) $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$ (4) $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$
104. Which of the following thermal stability order is not correct ?
(1) $\text{NaHCO}_3 < \text{KHCO}_3 < \text{RbHCO}_3$
(2) $\text{CaO}_2 > \text{SrO}_2 > \text{BaO}_2$
(3) $\text{Na}_2\text{SO}_4 > \text{MgSO}_4 > \text{Al}_2(\text{SO}_4)_3$
(4) $\text{CCl}_4 > \text{SiCl}_4 > \text{GeCl}_4 > \text{SnCl}_4$
105. Least stable hydride is :-
(1) SnH_4 (2) SiH_4 (3) PbH_4 (4) GeH_4
106. Which of the following compound give metal and oxygen gas at high temp :-
(1) NaNO_3 (2) Ag_2CO_3
(3) K_2CO_3 (4) Li_2CO_3
107. In which of the following species presence of lone pair does not affect idealized bond angle ?
(I) PF_3 (II) BrF_3 (III) IF_5
(IV) ICl_4^- (V) XeF_2
(1) I, II, III (2) IV, V
(3) II, V (4) None of these
108. The incorrect order of bond angle :-
(1) $\text{CO}_2 > \text{CO}_3^{2-} > \text{CF}_2\text{Cl}_2$
(2) $\text{NF}_3 > \text{NH}_3 > \text{NCl}_3$
(3) $\text{NO}_2^+ > \text{NO}_3^- > \text{NO}_2^-$
(4) $\text{PH}_3 > \text{AsH}_3 > \text{SbH}_3$
109. Which of the following is correct decreasing order of bond length ?
(1) $\text{P-O} > \text{S-O} > \text{Cl-O}$
(2) $\text{P-O} > \text{Cl-O} > \text{S-O}$
(3) $\text{S-O} > \text{Cl-O} > \text{P-O}$
(4) $\text{Cl-O} > \text{S-O} > \text{P-O}$
110. Which of the following species are hypervalent?
(A) ClO_4^- (B) BF_3 (C) SO_4^{2-} (D) CO_3^{2-}
(1) A, B, C (2) C, D
(3) A, C (4) A, B

111. The correct order of increasing C–O bond length of CO, CO₃²⁻ and CO₂ is :-

- (1) CO₃²⁻ < CO₂ < CO (2) CO < CO₂ < CO₃²⁻
(3) CO < CO₃²⁻ < CO₂ (4) CO₂ < CO₃²⁻ < CO

112. The specie having pyramidal shape is :-

- (1) OSF₂ (2) BrF₃ (3) ClO₂⁻¹ (4) SO₃

113. PCl₅ exist but NCl₅ does not because :-

- (1) Nitrogen atom is much smaller than P
(2) NCl₅ is unstable
(3) Nitrogen has no vacant d-orbitals
(4) Nitrogen is highly inert

114. The correct order of increasing s-character (in percentage) in the hybrid orbitals of following molecules/ions is :-

- (A) CO₃²⁻ (B) NCl₃ (C) BeCl₂
(1) B < A < C (2) A < B < C
(3) C < A < B (4) C < B < A

115. Among MgCl₂, RbCl, BeCl₂ and LiCl. The compounds with highest and lowest ionic characters are :-

- (1) RbCl and BeCl₂ (2) MgCl₂ and BeCl₂
(3) BeCl₂ and MgCl₂ (4) RbCl and LiCl

116. Which of the following is correct order of dipole moment ?

- (1) NH₃ > NF₃ (2) BF₃ > BCl₃
(3) CF₄ > CH₄ (4) XeF₂ > XeO₃F₂

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	3	1	2	4	4	4	3	4	3	2	3	4	1	3	4
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans	3	2	1	4	1	3	4	3	2	3	3	2	3	1	3
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans	2	2	4	4	2	2	4	4	2	3	2	2	1	1	4
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans	1	1	1	1	1	3	2	4	3	2	4	3	2	1	4
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans	2	3	1	1	2	1	3	3	3	1	4	1	4	2	2
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans	4	1	2	4	3	3	2	2	4	4	4	3	1	1	2
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans	1	4	3	3	3	4	3	4	4	3	3	1	2	2	3
Que.	106	107	108	109	110	111	112	113	114	115	116				
Ans	2	2	2	1	3	2	1	3	1	1	1				

COORDINATION COMPOUNDS & d-BLOCK COMPOUNDS

- The oxidation state of Mo in its oxido-complex species $[\text{Mo}_2\text{O}_4(\text{C}_2\text{H}_4)_2(\text{H}_2\text{O})_2]^{2-}$ is :-
(1) +2 (2) +3 (3) +4 (4) +5
- What is the charge on the complex ?
 $[\text{Cr}(\text{C}_2\text{O}_4)_2(\text{H}_2\text{O})_2]$ formed by Cr(III)
(1) +3 (2) +1 (3) +2 (4) -1
- In which of the following complex the nickel metal is in highest oxidation state?
(1) $\text{Ni}(\text{CO})_4$ (2) K_2NiF_6
(3) $[\text{Ni}(\text{NH}_3)_6](\text{BF}_4)_2$ (4) $\text{K}_4[\text{Ni}(\text{CN})_6]$
- A complex of platinum, ammonia and chloride produces four ions per molecule in the solution. The structure consistent with the observation is :-
(1) $[\text{Pt}(\text{NH}_3)_4]\text{Cl}_4$ (2) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_4]$
(3) $[\text{Pt}(\text{NH}_3)_5\text{Cl}]\text{Cl}_3$ (4) $[\text{Pt}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}_2$
- How many moles of AgCl would be obtained, when $\text{Co}(\text{NH}_3)_5\text{Cl}_3$ is treated with excess of AgNO_3 ?
(1) 1 mol (2) 2 mol
(3) 3 mol (4) No ppt is formed
- The oxidation number of Co in the complex ion:-
$$\left[(\text{en})_2\text{Co} \begin{array}{c} \text{NH} \\ \diagup \quad \diagdown \\ \text{OH} \end{array} \text{Co}(\text{en})_2 \right]^{3+}$$

(1) +2 (2) +3 (3) +4 (4) +6
- The donor sites of $[\text{EDTA}]^{4-}$ are :-
(1) O atoms only
(2) N atoms only
(3) Two N atoms and four O atoms
(4) Three N atoms and Three O atoms
- Among the following, metal carbonyls, the C-O bond is strongest in :-
(1) $[\text{Mn}(\text{CO})_6]^+$ (2) $[\text{Cr}(\text{CO})_6]$
(3) $[\text{V}(\text{CO})_6]^-$ (4) $[\text{Ti}(\text{CO})_6]^{2-}$
- The bond length in CO is $1.128\text{\AA}$. What will be the bond length of CO in $\text{Fe}(\text{CO})_5$?
(1) $1.158\text{\AA}$ (2) $1.128\text{\AA}$
(3) $1.078\text{\AA}$ (4) $1.118\text{\AA}$
- Among the following metal carbonyls, in the C-O bond order is lowest in ?
(1) $[\text{Mn}(\text{CO})_6]^+$
(2) $[\text{Fe}(\text{CO})_5]$
(3) $[\text{Cr}(\text{CO})_6]$
(4) $[\text{V}(\text{CO})_6]^-$
- Which of the following are bidentate monovalent anion ligands ?
(a) Acetylacetonato
(b) Oxalato ion
(c) Dimethylglyoximato
Select the correct answer :-
(1) (a) only
(2) (a) and (c) only
(3) (c) only
(4) (b) and (c) only
- Diethylenetriamine is :-
(1) Chelating agent
(2) Tridentate neutral molecule
(3) Tridentate monoanion
(4) (1) and (2) both
- Total number of isomers in $[\text{Pt}(\text{NH}_3)_2(\text{CN})_2]$ is :-
(1) 2 (2) 4 (3) 6 (4) 8
- Which of the following name is impossible ?
(1) Potassium tetrafluoridoxido chromate (VI)
(2) Barium tetrafluoridochromate (II)
(3) Dichlorobis (urea) copper (II)
(4) All are impossible
- The formula of sodium nitroprusside is :-
(1) $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NO}_2]$
(2) $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]$
(3) $\text{NaFe}[\text{Fe}(\text{CN})_6]$
(4) $\text{Na}_2[\text{Fe}(\text{CN})_6\text{NO}_2]$
- The formula of complex tris (ethylenediamine) cobalt (III) sulphate is :-
(1) $[\text{Co}(\text{en})_2\text{SO}_4]$
(2) $[\text{Co}(\text{en})_3\text{SO}_4]$
(3) $[\text{Co}(\text{en})_3]_2\text{SO}_4$
(4) $[\text{Co}(\text{en})_3]_2(\text{SO}_4)_3$

17. Which of following pairs of name and formula of complexes, is not correct ?
 (1) Tetraamminecopper(II)sulphate.....
 $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$
 (2) Diamminesilver(I)chloride.. $[\text{Ag}(\text{NH}_3)_2]\text{Cl}$
 (3) Potassiumhexacyanidoferrate(III).. $\text{K}_4[\text{Fe}(\text{CN})_6]$
 (4) Potassiumamminepentachloridoplatinate(IV)
 $\text{K}[\text{PtCl}_5(\text{NH}_3)]$
18. Complex ion $[\text{CuCl}_2(\text{NH}_2\text{CONH}_2)_2]$ is named as :-
 (1) dichloro bis (urea) copper (II)
 (2) bis (urea) dichloro copper (II)
 (3) dichloro bis (urea) copper (I)
 (4) bis (urea) dichloro copper (I)
19. Trioxalatoaluminate (III) and tetrafluoroborate(III) ions are :-
 (1) $[\text{Al}(\text{C}_2\text{O}_4)_3]$, $[\text{BF}_4]^{3-}$
 (2) $[\text{Al}(\text{C}_2\text{O}_4)_3]^{3+}$, $[\text{BF}_4]^{3+}$
 (3) $[\text{Al}(\text{C}_2\text{O}_4)_3]^{3-}$, $[\text{BF}_4]^-$
 (4) $[\text{Al}(\text{C}_2\text{O}_4)_3]^{2-}$, $[\text{BF}_4]^{2-}$
20. Calculate the EAN of central atom in the following complexes :-
 (i) $[\text{Cr}(\text{CO})_6]$
 (ii) $[\text{Fe}(\eta^5\text{-C}_5\text{H}_5)_2]$
21. In sodium nitroprusside, The oxidation number coordination No. and effective atomic number of iron are respectively :-
 (1) +3, 6, 36 (2) +2, 6, 36
 (3) +3, 3, 36 (4) 6, +3, 35
22. In Tollen's reagent $[\text{Ag}(\text{NH}_3)_2]^+$. The oxidation number coordination number and effective atomic number of central metal ion are respectively :-
 [Atomic number of Ag = 47]
 (1) +1, 2, 50 (2) +1, 2, 51
 (3) +2, 1, 50 (4) +1, 1, 50
23. The effective atomic no. of $\text{Co}(\text{CO})_4$ is 35 and hence is less stable. It attains stability by :-
 (1) oxidation of Co
 (2) Reduction of Co
 (3) dimerization
 (4) (2) & (3) both
24. Which of the following shows maximum molar conductance ?
 (1) $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ (2) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$
 (3) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$ (4) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
25. A Coordination complex has the formula $\text{PtCl}_4 \cdot 2\text{KCl}$. Electrical conductance measurements indicate the presence of three ion in one formula unit. Treatment with AgNO_3 produces no precipitate of AgCl . What is the coordination no. of Pt in this complex :-
 (1) 5 (2) 6 (3) 4 (4) 3
26. Which of the following complexes produces three moles of Silver chloride when its one mole is treated with excess of Silver nitrate ?
 (1) $[\text{Cr}(\text{H}_2\text{O})_3\text{Cl}_3]$
 (2) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl}$
 (3) $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2$
 (4) $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$
27. Concentrated H_2SO_4 will not dehydrate the following complex :-
 (1) $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2 \cdot \text{H}_2\text{O}$
 (2) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl} \cdot 2\text{H}_2\text{O}$
 (3) $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_6$
 (4) All of these
28. On adding AgNO_3 solution to a solution of $[\text{Pt}(\text{NH}_3)_3\text{Cl}_3]\text{Cl}$. The percentage of total chloride ion precipitated is :-
 (1) 100 (2) 75 (3) 50 (4) 25
29. One mole of the complex compound $\text{Co}(\text{NH}_3)_5\text{Cl}_3$ gives 3 moles of ion on dissolution in water. One mole of the same complex reacts with two moles of AgNO_3 solution to yield two moles of $\text{AgCl}(\text{s})$. The formula of the complex is :-
 (1) $[\text{Co}(\text{NH}_3)_4\text{Cl}]\text{Cl}_2 \cdot \text{NH}_3$
 (2) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
 (3) $[\text{Co}(\text{NH}_3)_3\text{Cl}]\text{Cl}_2 \cdot 2\text{NH}_3$
 (4) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl} \cdot \text{NH}_3$

30. Select the correct statement for the complexes $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$ and $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2 \cdot \text{H}_2\text{O}$

- (1) They can be differentiated by amount of precipitation.
- (2) They can be differentiated by electrical conductance measurement method.
- (3) They can be differentiated by heating with conc. H_2SO_4 .
- (4) All of these

31. Select incorrect match for $[\text{M}(\text{H}_2\text{O})_6]^{2+}$ complex :-

	Metal ions	Electronic configuration	CFSE
1	Mn^{2+}	$t_{2g}^3 e_g^2$	$0\Delta_0$
2	V^{2+}	$t_{2g}^3 e_g^0$	$-1.2\Delta_0$
3	Ni^{2+}	$t_{2g}^6 e_g^2$	$-1.6\Delta_0$
4	Ti^{2+}	$t_{2g}^2 e_g^0$	$-0.8\Delta_0$

32. Which of the following is non-conducting?

- (1) $\text{CoCl}_3 \cdot 6\text{NH}_3$
- (2) $\text{CoCl}_3 \cdot 5\text{NH}_3$
- (3) $\text{CoCl}_3 \cdot 4\text{NH}_3$
- (4) $\text{CoCl}_3 \cdot 3\text{NH}_3$

33. Following Sidgwick's rule of EAN, $\text{Fe}(\text{CO})_x$ will be :-

- (1) $x = 4$
- (2) $x = 3$
- (3) $x = 5$
- (4) $x = 6$

34. Which of the following cannot show linkage Isomerism ?

- (1) NO_2^-
- (2) SCN^-
- (3) CN^-
- (4) NH_3

35. The complexes $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_6]$ and $[\text{Pt}(\text{NH}_3)_4\text{Cl}_2][\text{PtCl}_4]$ are :-

- (1) Linkage isomers
- (2) Optical isomers
- (3) Co-ordination isomers
- (4) Ionisation isomers

36. $[\text{Co}(\text{NH}_3)_5\text{NO}_2]\text{Cl}_2$ and $[\text{Co}(\text{NH}_3)_5\text{ONO}]\text{Cl}_2$ are related to each other as :-

- (1) Geometrical isomers
- (2) Linkage isomers
- (3) Coordination isomers
- (4) ionisation isomers

37. The no. of geometrical isomers of $[\text{Co}(\text{NH}_3)_3(\text{NO}_3)_3]$ are :-

- (1) 0
- (2) 2
- (3) 3
- (4) 4

38. Consider the following statement and arrange in the order of true/false as given in the codes :-

(a) $[\text{Cr}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ and $[\text{Cr}(\text{NH}_3)_4(\text{CN})_2][\text{Cr}(\text{NH}_3)_2(\text{CN})_4]$ are coordination isomers.

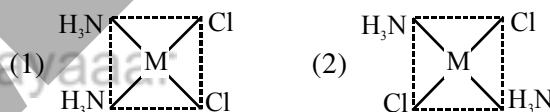
(b) $[\text{Cr}(\text{Py})_2(\text{H}_2\text{O})_2\text{Cl}_2]\text{Cl}$ and $[\text{Cr}(\text{Py})_2(\text{H}_2\text{O})\text{Cl}_3]\text{H}_2\text{O}$ are ionisation isomers.

(c) $[\text{Pt}(\text{NH}_3)_4\text{Br}_2]\text{Cl}_2$ and $[\text{Pt}(\text{NH}_3)_4\text{Cl}_2]\text{Br}_2$ are linkage isomers.

(d) $[\text{PtCl}_2(\text{NH}_3)_2]$ exhibits optical isomerism

- (1) TTFT
- (2) FTFT
- (3) TTFF
- (4) TFFF

39. Which of following isomers of $[\text{M}(\text{NH}_3)_2\text{Cl}_2]$ would react with silver oxalate ($\text{Ag}_2\text{C}_2\text{O}_4$) ?

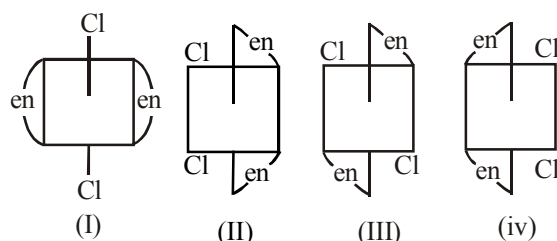


- (3) Both
- (4) None

40. Which of the following complex will follow EAN rule ?

- (1) $[\text{Mn}(\text{CO})_5]$
- (2) $[\text{Mn}(\text{CO})_6]$
- (3) $[\text{Fe}(\text{CO})_5]$
- (4) $[\text{Co}(\text{CO})_4]$

41. Identify the geometrical isomers of the following:-



- (1) I with III
- (2) II with IV
- (3) I with II
- (4) None of these

42. Which of the following compounds show optical isomerism ?

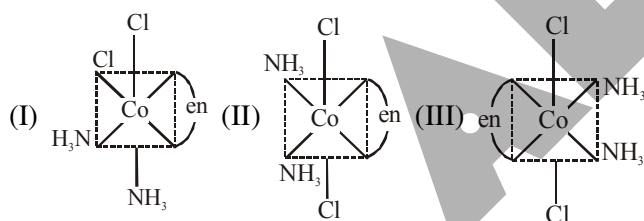
- (a) $\text{Cis-}[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$
(b) $\text{trans-}[\text{Co}(\text{en})_2\text{Cl}_2]^+$
(c) $\text{cis-}[\text{Co}(\text{en})_2\text{Cl}_2]^+$
(d) $[\text{Co}(\text{en})_3]^{3+}$

- (1) a & b
(2) b & c
(3) c & d
(4) a, b & d

43. Which of the following isomerism is/are not shown by the complex $[\text{CoCl}_2(\text{OH})_2(\text{NH}_3)_2]\text{Br}^-$?

- (1) Ionization
(2) Linkage
(3) Geometrical
(4) Optical

44. Three arrangements are shown for the complex $[\text{Co}(\text{en})(\text{NH}_3)_2\text{Cl}_2]^+$ pick up the correct statement:-



- (1) II and III are optical isomers
(2) I & III are optical isomers
(3) I & II are geometrical isomers
(4) II & III are geometrical isomers

45. Which kind of isomerism is exhibited by octahedral $[\text{Co}(\text{NH}_3)_4\text{Br}_2]\text{Cl}^-$?

- (1) Geometrical & ionization
(2) Geometrical & optical
(3) Optical & ionization
(4) Geometrical only

46. Which of the following has an optical isomer ?

- (1) $[\text{Co}(\text{en})(\text{NH}_3)_2]^{2+}$
(2) $[\text{Co}(\text{H}_2\text{O})_4(\text{en})]^{3+}$
(3) $[\text{Co}(\text{en})_2(\text{NH}_3)_2]^{3+}$
(4) $[\text{Co}(\text{NH}_3)_3\text{Cl}]^+$

47. Which of the following pairs represents linkage isomers ?

- (1) $[\text{Pd}(\text{PPh}_3)_2(\text{NCS})_2]$ and $[\text{Pd}(\text{PPh}_3)_2(\text{SCN})_2]$
(2) $[\text{Co}(\text{NH}_3)_5\text{NO}_3]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{NO}_3$
(3) $[\text{PtCl}_2(\text{NH}_3)_4]\text{Br}_2$ and $[\text{PtBr}_2(\text{NH}_3)_4]\text{Cl}_2$
(4) $[\text{Cu}(\text{NH}_3)_4][\text{PtCl}_4]$ and $[\text{Pt}(\text{NH}_3)_4][\text{CuCl}_4]$

48. Select the correct statement from the following?

- (1) $[\text{Sc}(\text{H}_2\text{O})_6]^{3+}$ and $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ both are colourless
(2) $[\text{Co}(\text{NH}_3)_4\text{Br}_2]\text{Cl}$ show ionization isomers and geometrical isomers
(3) $[\text{Pd}(\text{NO}_2)_2(\text{NH}_3)_2]$ is square planar and shows geometrical as well as linkage isomers
(4) Both (2) and (3) are correct

49. $[\text{Fe}(\text{en})_2(\text{H}_2\text{O})_2]^{2+} + \text{en} \rightarrow \text{complex (x)}$. The correct statement about the complex (x) it is:-

- (1) a low spin complex
(2) diamagnetic
(3) shows geometrical isomerism
(4) (1) and (2) both

50. Which kind of isomerism is shown by the complex $[\text{Co}(\text{NH}_3)_5(\text{ONO})]\text{SO}_4^-$?

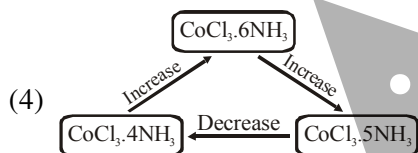
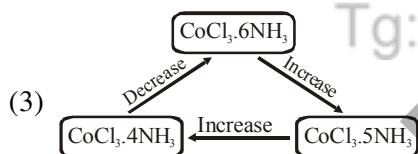
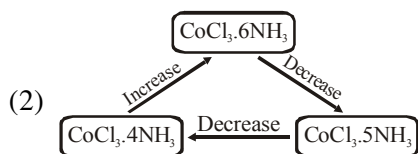
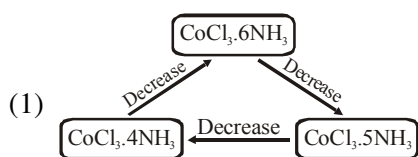
1. Ionization isomerism
2. Linkage isomerism
3. Geometrical isomerism
4. Optical isomerism
(1) 1, 2, 3, & 4 are correct
(2) 1, 3, & 4 are correct only
(3) 1 & 2 are correct only
(4) 2, 3 & 4 are correct only

51. Which of the following complexes show geometrical as well as optical isomerism ?
 (i) $[\text{Cr}(\text{ox})_3]^{3-}$
 (ii) $[\text{Rh}(\text{en})_2\text{Cl}_2]^+$
 (iii) $[\text{Co}(\text{NH}_3)_2\text{Cl}_2(\text{en})]^+$
 Select the correct code
 (1) (i) only (2) (i) & (ii) only
 (3) (ii) & (iii) only (4) (i), (ii), & (iii)
52. The total No. of possible isomers of the compound $[\text{Cu}^{\text{II}}(\text{NH}_3)_4][\text{Pt}^{\text{II}}\text{Cl}_4]$ are :-
 (1) 3 (2) 5 (3) 4 (4) 6
53. $[\text{Co}(\text{en})_3]^{3+}$ ion is expected to show :-
 (1) Two optically active isomers
 (2) Two optically inactive isomers
 (3) four optically active isomers; cis, d & ℓ from and trans d & ℓ form
 (4) None
54. The number of geometrical isomers for octahedral $[\text{Co}(\text{NH}_3)_2\text{Cl}_4]^-$, square planar $[\text{AuCl}_2\text{Br}_2]^-$ respectively are :-
 (1) 4, 2 (2) 2, 2 (3) 3, 2 (4) 2, 3
55. How many isomers are possible for the complex ion $[\text{Cr}(\text{NH}_3)_3\text{Cl}_3]$?
 (1) 3 (2) 2 (3) 4 (4) 5
56. Complex
 (a) $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]$
 (b) $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]\text{SO}_4$
 (c) $\text{K}_4[\text{Fe}(\text{CN})_6]$
 Which of the following statement are wrong ?
 (1) (a) is used in detection of S^{2-}
 (2) complex part of each compound is octahedral
 (3) (c) is used in detection of Fe^{3+}
 (4) Oxidation state of Fe in (a) and (b) is +1
57. $[\text{Pt}(\text{NH}_3)(\text{NH}_2\text{OH})(\text{NO}_2)(\text{Py})]^+$ will form how many geometrical isomers :-
 (1) 2 (2) 3 (3) 0 (4) 5
58. Isomerism exhibited by $[\text{Cr}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Cl}_2]^+$ are :-
 (1) Ionisation, optical
 (2) Hydrate, optical
 (3) Geometrical, optical
 (4) Coordinate, geometrical
59. Which of the following is true for the complex $\text{Co}(\text{NO}_2)(\text{Cl})_2.5\text{NH}_3$ (Co is in + 3 oxidation state)
 (1) It shows ionisation isomerism
 (2) It forms inner orbital complex
 (3) It is diamagnetic
 (4) All
60. The total No. of isomers possible for the complex $[\text{Co}(\text{en})_2\text{Cl}_2]$ is :-
 (1) 2 (2) 3 (3) 4 (4) 5
61. The complex $[\text{Pt}(\text{NH}_3)_4]^{2+}$ has structure :-
 (1) Square planar
 (2) Tetrahedral
 (3) Pyramidal
 (4) Pentagonal
62. Which of the following pair, the EAN of central metal atom is not same ?
 (1) $[\text{Fe}(\text{CN})_6]^{3-}$ and $[\text{Fe}(\text{NH}_3)_6]^{3+}$
 (2) $[\text{Cr}(\text{NH}_3)_6]^{3+}$ and $[\text{Cr}(\text{CN})_6]^{3-}$
 (3) $[\text{FeF}_6]^{3-}$ and $[\text{Fe}(\text{CN})_6]^{3-}$
 (4) $[\text{Ni}(\text{CO})_4]$ and $[\text{Ni}(\text{CN})_4]^{2-}$
63. In complexes most stability is shown by:-
 (1) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$
 (2) $[\text{Fe}(\text{CN})_6]^{3-}$
 (3) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$
 (4) $[\text{FeCl}_6]^{3-}$
64. When MnO_2 is fused with KOH , a coloured compound is the product and the colour is ?
 (1) Mn_2O_4 , black
 (2) KMnO_4 , purple
 (3) Mn_2O_3 , brown
 (4) K_2MnO_4 , green
65. Which of the following is not correctly matched ?
 (1) $[\text{Fe}(\text{CN})_6]^{3-}$ – d^2sp^3 and paramagnetic
 (2) $[\text{Fe}(\text{CO})_5]$ – dsp^3 and diamagnetic
 (3) $[\text{Fe}(\text{en})_3]^{3+}$ – sp^3d^2 and paramagnetic
 (4) $[\text{ZnCl}_2(\text{PPh}_3)_2]$ – sp^3 and paramagnetic

66. Which of the following is incorrectly matched complex ?

	Complex	Oxidation number	Electronic configuration
1	$K_3[Co(C_2O_4)_3]$	+3	$t_{2g}^6 e_g^0$
2	$K_4[Fe(CN)_6]$	+2	$t_{2g}^4 e_g^2$
3	$[Cr(en)_2Cl_2]Cl$	+3	$t_{2g}^3 e_g^0$
4	$[Mn(H_2O)_6]SO_4$	+2	$t_{2g}^3 e_g^2$

67. Which of the following diagrams is correctly related to the conductivity of complex having same condition in water ?



68. The complex $[Fe(H_2O)_5NO]^{2+}$ is formed in Brown ring test for nitrates select correct statement for the complex ?

- (1) Hybridisation of Fe is sp^3d^2
- (2) Fe and NO has +1 oxidation state
- (3) It has spin only magnetic moment of 3.87 B.M.
- (4) All are correct

69. Which are the correct statements ?

- (1) $[Ag(NH_3)_2]^+$ is linear with sp hybridised Ag^+ ion
- (2) $NiCl_4^{2-}$, VO_4^{3-} and MnO_4^- have tetrahedral geometry
- (3) $[Cu(NH_3)_4]^{2+}$, $[Pt(NH_3)_4]^{2+}$ and $[Ni(CN)_4]^{2-}$ have dsp^2 hybridisation of the metal ion
- (4) All the correct

70. Which of the following is/are inner orbital complex as well as paramagnetic with magnetic moment equal to 3.8 (approx) ?

- (1) $[Co(ox)_3]^{3-}$
- (2) $[Cr(NH_3)_6]^{3+}$
- (3) $[Fe(H_2O)_5NO]^{2+}$
- (4) $[Zn(NH_3)_6]^{2+}$

71. Which of the following species can act as reducing agent ?

- (1) $[Co(CO)_4]^-$
- (2) $Mn(CO)_6$
- (3) $Mn(CO)_5$
- (4) $Cr(CO)_6$

72. $Na_2S + Na_2[Fe(CN)_5NO] \rightarrow Na_4[Fe(CN)_5NOS]$. Oxidation number of Fe in reactant (complex) and product (complex) are :-

- (1) 2, 1
- (2) 2, 2
- (3) 2, 3
- (4) 3, 3

73. Which of the following are square planar complexes ?

- (i) $[AuCl_4]^-$
- (ii) $[PtCl_4]^{2-}$
- (iii) $[Mn(Br)_4]^{2-}$
- (iv) $[Cu(NH_3)_4]^{2+}$

Select the correct answer using the codes given below :-

- (1) i and ii only
- (2) ii and iii only
- (3) ii and iv only
- (4) i, ii, and iv only

74. The crystal field-splitting for Cr^{3+} ion in octahedral field changes for I^- , H_2O , NH_3 , CN^- and the increasing order is :-

- (1) $I^- < H_2O < NH_3 < CN^-$
- (2) $CN^- < I^- < H_2O < NH_3$
- (3) $CN^- < NH_3 < H_2O < I^-$
- (4) $NH_3 < H_2O < I^- < CN^-$

75. Which of the following is a high spin complex?

- (1) $[Co(NH_3)_6]^{3+}$
- (2) $[Fe(CN)_6]^{4-}$
- (3) $[Ni(CN)_4]^{2-}$
- (4) $[FeF_6]^{3-}$

76. Which has maximum paramagnetic nature ?

- (1) $[Cu(H_2O)_4]^{2+}$
- (2) $[Cu(NH_3)_4]^{2+}$
- (3) $[Mn(H_2O)_6]^{2+}$
- (4) $[Fe(CN)_6]^{4-}$

77. Which of the following order of CFSE is incorrect?
- (1) $[\text{Cr}(\text{NO}_2)_6]^{3-} > [\text{Cr}(\text{NH}_3)_6]^{3+} > [\text{Cr}(\text{H}_2\text{O})_6]^{3+}$
 - (2) $[\text{PtF}_4]^{2-} > [\text{PdF}_4]^{2-} > [\text{NiF}_4]^{2-}$
 - (3) $[\text{Ni}(\text{DMG})_2] < [\text{Ni}(\text{en})_2]^{2+}$
 - (4) $[\text{Co}(\text{EDTA})]^- > [\text{Co}(\text{en})_3]^{3+}$
78. Which of the following is/are inner orbital complex as well as diamagnetic in nature ?
- (1) $[\text{Zn}(\text{NH}_3)_6]^{2+}$
 - (2) $[\text{Ni}(\text{NH}_3)_6]^{2+}$
 - (3) $[\text{Cr}(\text{NH}_3)_6]^{3+}$
 - (4) $[\text{Co}(\text{NH}_3)_6]^{3+}$
- [Atomic no. $\rightarrow$ Cr=24, Mn=25, Fe=26, Co=27]
79. Which of the following is/are correct about $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$?
- (1) It is a Tetrahedral complex
 - (2) It is paramagnetic with one unpaired electron in the d-subshell
 - (3) It gives white precipitate with BaCl_2
 - (4) Its aqueous solution does not conduct electricity.
80. The hybridisation of $[\text{CoF}_6]^{3-}$ & $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$ are:-
- (1) Both sp^3d^2
 - (2) Both d^2sp^3
 - (3) sp^3d^2 and d^2sp^3
 - (4) d^2sp^3 and sp^3d^2
81. A complex of certain metal has the spin only magnetic moment of 4.91 BM. whereas another complex of the same metal with same oxidation state has zero magnetic moment. The metal Ion could be ?
- (1) Co^{2+}
 - (2) Mn^{2+}
 - (3) Fe^{2+}
 - (4) Fe^{3+}
82. $[\text{Sc}(\text{H}_2\text{O})_6]^{3+}$ ion is :-
- (1) Coloured and paramagnetic
 - (2) Colourless and paramagnetic
 - (3) Colourless and diamagnetic
 - (4) Coloured & diamagnetic
83. Which of the following complex compounds does not exhibits cis-trans isomerism ?
- (1) $[\text{PtCl}_2(\text{NH}_3)_2]$
 - (2) $[\text{PdCl}_2\text{BrI}]$
 - (3) $[\text{Pt}(\text{NH}_3)_2(\text{Cl})(\text{Br})]$
 - (4) $[\text{Pt}(\text{NH}_3)_3(\text{Cl})]^+$
84. Which of the following is correct?
- (1) $\text{Ti}(\text{NO}_3)_4$ is coloured
 - (2) $[\text{Cr}(\text{NH}_3)_6]\text{Cl}_3$ is colourless
 - (3) $\text{K}_3[\text{VF}_6]$ is colourless
 - (4) $[\text{Ni}(\text{CN})_4]^{2-}$ is colourless
85. Of the following complex ions. The one that probably has the largest overall formation constant K_f is :-
- (1) $[\text{Co}(\text{NH}_3)_6]^{3+}$
 - (2) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$
 - (3) $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_4]^{3+}$
 - (4) $[\text{Co}(\text{en})_3]^{3+}$
86. Which is not a π -bonded organo metallic complex ?
- (1) Zeise's salt
 - (2) ferrocene
 - (3) bis(benzene) chromium
 - (4) Tetraethyl lead
87. What is wrong about the compound ? $\text{K}[\text{Pt}(\eta^2\text{-C}_2\text{H}_4)\text{Cl}_3]$
- (1) It is called zeise's salt
 - (2) It is π bonded complex
 - (3) Oxidation number of Pt is + 4
 - (4) Four ligands surrounds the platinum atom
88. Which of the following order is not correct ?
- (1) $[\text{Cr}(\text{NH}_3)_6]^{+3} > [\text{Mn}(\text{CN})_6]^{3-} > [\text{V}(\text{CO})_6]^-$
spin only m.m.
 - (2) $[\text{Co}(\text{CN})_6]^{3-} > [\text{Co}(\text{NH}_3)_6]^{+3} > [\text{Co}(\text{H}_2\text{O})_6]^{+3}$ Δ_0 value
 - (3) $[\text{Ni}(\text{CO})_4] > [\text{Co}(\text{CO})_4]^- > [\text{Fe}(\text{CO})_4]^{-2}$
(M-C bond strength)
 - (4) $[\text{Ni}(\text{NH}_3)_4]^{+2} < [\text{Ni}(\text{en})(\text{NH}_3)_2]^{+2} < [\text{Ni}(\text{en})_2]^{+2}$
(Thermodynamic stability)

89. Which of the following is correct for zeise's salt ?
 (1) The complex ion is square planar
 (2) The CMI, Pt is in + 2 oxidation state
 (3) $\text{H}_2\text{C}=\text{CH}_2$ Molecule is perpendicular to the PtCl_3 plane
 (4) All of these
90. Which amongst the following are organo metallic compounds ?
 (i) $\text{Al}_2(\text{CH}_3)_6$ (ii) $\text{K}[\text{PtCl}_3(\text{C}_2\text{H}_2)]$ (iii) $\text{N}(\text{CH}_3)_3$
 (1) i only (2) iii only
 (3) i, ii, and iii (4) i and ii only
91. Which of the following aquated metal ions has the highest paramagnetism ?
 (1) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ (2) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$
 (3) $[\text{Cu}(\text{H}_2\text{O})_6]^{3+}$ (4) $[\text{Zn}(\text{H}_2\text{O})_6]^{2+}$
92. Coordination isomerism is possible in :-
 (1) $[\text{Ag}(\text{NH}_3)_2][\text{Ag}(\text{CN})_2]$
 (2) $[\text{Pt}(\text{en})_2][\text{PtCl}_4]$
 (3) $[\text{Pt}(\text{NH}_3)_4][\text{Pt}(\text{C}_2\text{O}_4)_2]$
 (4) $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_6]$
93. Which amongst the following metal carbonyls are inner orbital complex with diamagnetic property ?
 (i) $\text{Ni}(\text{CO})_4$ (ii) $\text{Fe}(\text{CO})_5$
 (iii) $\text{V}(\text{CO})_6$ (iv) $\text{Cr}(\text{CO})_6$
 Select the correct code :-
 (1) I & II (2) II, III & IV
 (3) II & IV (3) I, II, & IV
94. To an acidified dichromate solution, a pinch of Na_2O_2 is added and shaken. What is observed:
 (1) blue colour
 (2) Orange colour changing to green
 (3) No evolution of oxygen
 (4) Bluish - green precipitate
95. Pick out the incorrect statement:
 (1) MnO_4^{2-} is quite strongly oxidizing and stable only in very strong alkalies. In acidic and neutral solutions, it disproportionates.
 (2) In acidic solutions, MnO_4^- is reduced to Mn^{2+} and thus, KMnO_4 is widely used as oxidising agent
 (3) KMnO_4 does not acts as oxidising agent in alkaline medium
 (4) KMnO_4 is manufactured by the fusion of pyrolusite ore with KOH in presence of air or KNO_3 , followed by electrolytic oxidation in acidic medium
96. When a small amount of KMnO_4 is added to concentrated H_2SO_4 , a green oily compound is obtained which is highly explosive in nature. Compound may be :-
 (1) Mn_2O_3 (2) MnSO_4
 (3) Mn_2O_7 (4) MnO_2
97. The incorrect statement(s) about Cr^{2+} and Mn^{3+} is (are) :-
 [Atomic numbers of Cr = 24 and Mn = 25]
 (1) Cr^{2+} is a reducing agent
 (2) Mn^{3+} is an oxidizing agent
 (3) Both Cr^{2+} and Mn^{3+} exhibit d^4 electronic configuration
 (4) When Cr^{2+} is used as a reducing agent, the chromium ion attains d^5 electronic configuration
98. Chromyl chloride test is given by :-
 (1) CH_3Cl (2) AgCl
 (3) Hg_2Cl_2 (4) NH_4Cl
99. Crystal field stabilisation energy for high spin d^4 octahedral complex is :-
 (1) $-1.8 \Delta_0$ (2) $-0.6 \Delta_0$
 (3) $-1.2 \Delta_0$ (4) $-1.6 + P$
100. Select the incorrect statement on basis of following conversion :-

$$\begin{array}{ccccc} \text{X} & \xrightarrow[\text{air}]{\text{KOH}} & \text{Y} & \xrightarrow{\text{H}^+} & \text{Z} + \text{X} \\ \text{Black} & & \text{Dark} & & \text{an oxidising} \\ \text{coloured} & & \text{green} & & \text{agent} \\ \text{ore} & & & & \end{array}$$

 (1) X may be MnO_2
 (2) Y can be K_2MnO_4
 (3) Z can be KMnO_4
 (4) Same oxidation state of Mn in X, Y & Z
101. When KMnO_4 reacts with KBr in acidic medium then oxidation state of Mn changes from +7 to ?
 (1) +2 (2) +4 (3) +3 (4) +6
102. Crystal field stabilisation energy for complex $[\text{Co}(\text{CN})_6]^{-3}$ will be :-
 (1) $+2.4 \Delta_0 + 3P$ (2) $-2.4 \Delta_0 + 2P$
 (3) $-3.6 \Delta_0 + 3P$ (4) $-1.8 \Delta_0 + 3P$

103. Which of the following is an oxidising agent?

- (1) $[\text{Mn}_2(\text{CO})_{10}]$ (2) $[\text{Fe}(\text{CO})_5]$
(3) $[\text{Mn}(\text{CO})_5]$ (4) $[\text{Fe}_2(\text{CO})_9]$

104. Species which represent maximum stability ?

- (1) $[\text{Co}(\text{CN})_6]^{-3}$ (2) $[\text{Co}(\text{C}_2\text{O}_4)_3]^{-3}$
(3) $[\text{Ni}(\text{H}_2\text{O})_6]^{+2}$ (4) Both (1) and (2)

105. What is the crystal field stabilisation energy value of d^5 configuration for tetrahedral complex ?

- (1) $0.4\Delta_t$ (2) 0 (3) $-\frac{2}{5}\Delta_t$ (4) $\frac{12}{5}\Delta_t$

106. Which of the following complex show maximum numbers of stereo isomers is ?

- (1) $[\text{PtCl}_3(\text{C}_2\text{H}_4)]^\ominus$
(2) $[\text{CuBr}_2\text{Cl}_2]^{-2}$
(3) $[\text{Cr}(\text{NH}_3)_2(\text{en})_2]^{+3}$
(4) $[\text{Co}(\text{C}_2\text{O}_4)_3]^{-3}$

107. A 'Pt' complex of NH_3 and chlorine produces four ions per molecule in the solution is :-

- (1) $[\text{Pt}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}_2$ (2) $[\text{Pt}(\text{NH}_3)_6]\text{Cl}_4$
(3) $[\text{Pt}(\text{NH}_3)_2]\text{Cl}_4$ (4) $[\text{Pt}(\text{NH}_3)_5\text{Cl}]\text{Cl}_3$

108. The most stable complex ion is :-

- (1) $[\text{Fe}(\text{H}_2\text{O})_6]^{+3}$ (2) $[\text{Cu}(\text{NH}_3)_4]^{+2}$
(3) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{-3}$ (4) $[\text{Ni}(\text{dmg})_2]$

109. Which of the following complex is example of strongest reducing agent ?

- (1) $[\text{Co}(\text{CN})_6]^{-3}$ (2) $[\text{Co}(\text{CN})_6]^{-4}$
(3) $[\text{Ag}(\text{CN})_2]^{-1}$ (4) $[\text{Cu}(\text{CN})_4]^{-3}$

110. Pair of compound which is planar :-

- (1) $[\text{Ni}(\text{CN})_4]^{-4}$, $[\text{PtCl}_4]^{-2}$
(2) $[\text{NiCl}_4]^{-4}$, $[\text{Ni}(\text{CN})_4]^{-2}$
(3) $[\text{PtCl}_4]^{-2}$, $[\text{Ni}(\text{CO})_4]$
(4) $[\text{Ni}(\text{CN})_4]^{-2}$, $[\text{Rh}(\text{CO})_2(\text{PPh}_3)_2]^+$

MATCH THE COLUMN

111. Match the pair of complexes given in **Column-I** the characteristic (s) given in **Column-II**

Column-I	Column-II
(A) $(\text{NH}_4)_2[\text{NiCl}_4]$ and $(\text{NH}_4)_2[\text{Ni}(\text{CN})_4]$	(P) Both show same electrical conductance.
(B) $\text{CoCl}_3.6\text{NH}_3$ and $\text{PtCl}_4.5\text{NH}_3$	(Q) Both show same EAN.
(C) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ and $(\text{NH}_4)_2[\text{PtCl}_4]$	(R) Both show same primary valencies
(D) $\text{K}_2[\text{Fe}(\text{H}_2\text{O})_2\text{Cl}_4]$ and $\text{K}_4[\text{FeCl}_6]$	(S) Both gives white precipitate with AgNO_3 Solution

112. Match the column correctly :-

Column-I	Column-II
(A) $[\text{Pd}(\text{NH}_3)_2\text{Cl}_2]$	(p) Geometrical isomerism
(B) $[\text{Co}(\text{OX})_3]^{3-}$	(q) Diamagnetic
(C) $[\text{Fe}(\text{H}_2\text{O})_4\text{Cl}_2]$	(r) Inner orbital complex
(D) $[\text{Co}(\text{NH}_3)_2(\text{NO}_2)_4]^{-}$	(s) Paramagnetic

113. Match the column correctly :-

Column-I	Column-II
(A) $[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})_2]\text{Cl}_2$	(p) Geometrical isomers
(B) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$	(q) Paramagnetic
(C) $[\text{Co}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}$	(r) Diamagnetic
(D) $[\text{Ni}(\text{H}_2\text{O})_6]\text{Cl}_2$	(s) Metal ion with + 2 oxidation state

114. Match the column correctly :-

Column-I	Column-II
(A) $[\text{Ni}(\text{CO})_4]$	(p) Tetrahedral
(B) $[\text{Fe}(\text{CO})_5]$	(q) π -back bonding
(C) $[\text{Ni}(\text{CN})_4]^{-2}$	(r) diamagnetic
(D) $[\text{Ni}(\text{CN})_5]^{-3}$	(s) One of the ligand is three e^- donor

115. Match the column correctly :-

Column-I	Column-II
(A) $[\text{Cu}(\text{NH}_3)_4]^{2+}$	(p) Tetrahedral
(B) $[\text{CuCl}_4]^{2-}$	(q) Inner orbital complex
(C) $\text{K}_2[\text{Cr}(\text{CN})_4(\text{NH}_3)(\text{NO})]$	(r) Magnetic moment = 1.73 B.M.
(D) $\text{K}_4[\text{Co}(\text{NO}_2)_6]$	(s) Metal O.S. +2
	(t) During hybridisation d-orbital e^- jumps to higher energy orbital

116. Match the column correctly :-

Column-I	Column-II
(A) $[\text{Co}(\text{en})_3]^{3+}$	(p) $\text{sp}^3 \text{d}^2$ hybridisation
(B) $[\text{Co}(\text{ox})_3]^{3-}$	(q) Diamagnetic
(C) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$	(r) $\text{d}^2 \text{sp}^3$ hybridisation
(D) $[\text{Co}(\text{NO}_2)_6]^{4-}$	(s) Paramagnetic
	(t) Chelating reagent

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	2	4	2	3	2	2	3	1	1	4	2	4	3	1	2
Que.	16	17	18	19	20		21	22	23	24	25	26	27	28	29
Ans	4	3	1	3	(i) 36	(ii) 36	2	1	4	1	2	4	3	4	2
Que.	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Ans	4	3	4	3	4	3	2	2	4	1	3	3	3	2	3
Que.	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
Ans	1	3	1	4	4	3	3	3	1	2	2	4	2	3	4
Que.	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
Ans	2	1	4	2	4	3	2	2	4	4	2	2	2	4	1
Que.	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Ans	4	3	3	4	3	3	3	3	4	4	4	4	3	3	4
Que.	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104
Ans	4	2	4	3	1	3	3	4	4	2	4	1	2	3	1
Que.	105	106	107	108	109	110									
Ans	2	3	4	4	2	4									

MATCH THE COLUMN

Que.	111	(A) P, Q, R; (B) P, S; (C) Q, R; (D) Q, R
Que.	112	(A) p, q, r; (B) q, r; (C) p, s; (D) p, q, r
Que.	113	(A) p, q, s; (B) p, r, s; (C) q, s; (D) q, s
Que.	114	(A)-p, q, r; (B) q, r; (C) q, r; (D)-q, r
Que.	115	(A)-q, r, s, t; (B)-p, r, s; (C) q, r; (D)q, r, s, t
Que.	116	(A)-q,r,t; (B)-q,r,t; (C)p,s; (D) r,s

p-BLOCK ELEMENT

- The main factor responsible for weak acidic nature of B-F bond in BF_3 is :-
 (1) Large electronegativity of F
 (2) Three centred two electron bonds in BF_3
 (3) $p\pi - d\pi$ back bonding
 (4) $p\pi - p\pi$ back bonding
- Which of the following statement is true on the basis of back bonding ?
 (1) Si-O bond is stronger than C-O bond
 (2) Dimethyl ether acts as a better lewis base but not disilyl ether ($\text{SiH}_3\text{-O-SiH}_3$)
 (3) $(\text{CH}_3)_3\text{C-O-H}$ is less acidic than $(\text{CH}_3)_3\text{Si-OH}$
 (4) All of these
- Which of the following statements is/are false?
 (1) NMe_3 and $\text{N}(\text{SiH}_3)_3$ are not isostructural
 (2) Methyl isocyanate ($\text{CH}_3\text{-N=C=O}$) is bent but silyl isocyanate ($\text{SiH}_3\text{-N=C=O}$) is linear
 (3) In trisilyl amine $[(\text{SiH}_3)_3\text{N}]$ all N-Si bond lengths are identical but shorter than the expected N-Si bond length
 (4) None
- Which is food preservative as well as anti chlor?
 (1) SO_2 (2) PCl_5 (3) NO_2 (4) HCl
- There is no S-S bond in :-
 (1) $\text{S}_2\text{O}_3^{-2}$ (2) $\text{S}_2\text{O}_5^{-2}$
 (3) $\text{S}_2\text{O}_6^{-2}$ (4) $\text{S}_2\text{O}_7^{-2}$
- Determine the correct order of stability :-
 (1) $\text{Al}^{+1} > \text{Al}^{+3}$
 (2) $\text{Sn}^{+2} > \text{Sn}^{+4}$
 (3) $\text{Pb}^{+2} > \text{Pb}^{+4}$
 (4) $\text{Bi}^{+3} < \text{Bi}^{+5}$
- Which of the following oxyacid is not a true peracid ?
 (1) Perbenzoic acid (2) Pernitric acid
 (3) Perchloric acid (4) All of these.
- Which oxy acids are stable only in aq. state not in solid state ?
 (1) HClO_3 , HClO_4 (2) HBrO_4 , HIO_4
 (3) HBrO_3 , HIO_3 (4) HBrO_2 , HIO_2
- Which of the following is not correctly matched for solid state of following compound ?
 (1) AlCl_3 - nonplanar, all bonds are not identical
 (2) SO_3 - $p\pi - d\pi$ bonding present, sp^3 hybridisation
 (3) PBr_5 - sp^3 and sp^3d^2 hybridisation
 (4) BeCl_2 - Complete octet, nonplanar
- Number of P-OH bonds is sodium dihydrogen pyrophosphate :-
 (1) 4 (2) 3 (3) 2 (4) 0
- Which of the following pyroacid has X-X bond
 (1) $\text{H}_2\text{S}_2\text{O}_7$ (2) $\text{H}_2\text{S}_2\text{O}_5$
 (3) $\text{H}_4\text{P}_2\text{O}_5$ (4) $\text{H}_4\text{P}_2\text{O}_6$
- (I) $\text{H}_2\text{S}_2\text{O}_5$ (II) H_2SO_5 (III) $\text{H}_2\text{S}_2\text{O}_6$
 Increasing order of number of π -bonds in above compounds
 (1) $\text{I} < \text{II} < \text{III}$
 (2) $\text{III} < \text{II} < \text{I}$
 (3) $\text{II} < \text{I} < \text{III}$
 (4) $\text{I} > \text{III} > \text{II}$

	Compound	Properties
A	B_2H_6	3c 2e bond
B	HNO_3 , H_2SO_4	equal number of π bonds
C	AlF_3 , AlCl_3	Hypovalent
D	NCl_3 , SbCl_3	Equal bond angles

Correct code is :

- (1) A (2) A,C (3) A,D (4) All

- In which of the following options all species contain X-O-X bonds in structure (X = central atom) ?
 (1) $\text{H}_2\text{S}_2\text{O}_5$, S_3O_9 , $\text{S}_2\text{O}_6^{-2}$
 (2) P_4O_{10} , P_4O_6 , $\text{H}_3\text{P}_3\text{O}_9$
 (3) N_2O_5 , N_2O , N_2O_4
 (4) $\text{H}_4\text{P}_2\text{O}_7$, $\text{H}_4\text{P}_2\text{O}_6$, $\text{H}_4\text{P}_2\text{O}_5$
- Order of stability of halogen oxides :-
 (1) $\text{I} < \text{Cl} < \text{Br}$ (2) $\text{I} > \text{Cl} > \text{Br}$
 (3) $\text{I} < \text{Cl} > \text{Br}$ (4) $\text{I} > \text{Cl} < \text{Br}$

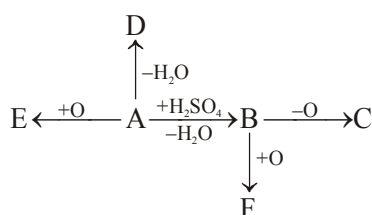
16. $(\text{Si}_2\text{O}_5)_n^{2n-}$ anion is obtained when :
- (1) no oxygen of a SiO_4^{4-} tetrahedron is shared with another SiO_4^{4-} tetrahedron
 - (2) one oxygen of a SiO_4^{4-} tetrahedron is shared with another SiO_4^{4-} tetrahedron
 - (3) two oxygen of a SiO_4^{4-} tetrahedron are shared with another SiO_4^{4-} tetrahedron
 - (4) three oxygen of a SiO_4^{4-} tetrahedron are shared with another SiO_4^{4-} tetrahedron
17. BCl_3 does not exist as dimer but BH_3 exist as dimer (B_2H_6) because :-
- (1) Chlorine is more electronegative than hydrogen
 - (2) There is $\text{p}\pi\text{-p}\pi$ back bonding in BCl_3 but BH_3 does not contain such bonding
 - (3) Large sized chlorine atoms do not fit between the small boron atoms whereas small sized hydrogen atoms get fitted between boron atoms.
 - (4) None of these
18. Incorrect statement regarding following reactions is :-
- $$\text{XeF}_6 \xrightarrow{\begin{matrix} +\text{Excess H}_2\text{O} \\ +2\text{H}_2\text{O} \end{matrix}} \begin{matrix} \text{'X'} + \text{HF} \\ \text{'Y'} + \text{HF} \end{matrix}$$
- (1) 'X' is explosive
 - (2) 'Y' is an oxyacid of xenon
 - (3) Both are example of non-redox reaction
 - (4) XeF_6 can undergo partial hydrolysis
19. $\text{Na}_2\text{S}_2\text{O}_3$ is oxidized by I_2 to give :-
- (1) Na_2S
 - (2) NaHSO_3
 - (3) Na_2SO_4
 - (4) $\text{Na}_2\text{S}_4\text{O}_6$
20. Correct statement about dipole moment is :-
- (1) $(\text{R}_3\text{NO})_\mu < (\text{R}_3\text{PO})_\mu$
 - (2) $(\text{R}_3\text{NO})_\mu > (\text{R}_3\text{PO})_\mu$
 - (3) $(\text{R}_3\text{NO})_\mu = (\text{R}_3\text{PO})_\mu$
 - (4) None of these
21. Product formed when PCl_5 react with conc. H_2SO_4 :-
- (1) SOCl_2
 - (2) SO_2Cl_2
 - (3) S_2Cl_2
 - (4) SO_2
22. Which of the following statement is correct:
- (1) KI is added into I_2 to increase its solubility in water
 - (2) Boron fibres are used in Bullet proof vest.
 - (3) Tl and Pb are poisonous in nature
 - (4) All of these
23. P-O-P bond is absent in :-
- (1) Dimetaphosphoric acid
 - (2) Pyro phosphorous acid
 - (3) Cyclic trimetaphosphoric acid
 - (4) Hypo phosphorous acid
24. Which of the following is incorrect for H_3BO_3 ?
- (1) It has a layer structure in which H_3BO_3 units are joined by hydrogen bonds.
 - (2) It is obtained by treating borax with conc. H_2SO_4 .
 - (3) It does not act as a proton donor but acts as an acid by accepting hydroxyl ions.
 - (4) It can't acts as mild antiseptic.
25. Maximum P-O-P linkage present in :-
- (1) P_4O_6
 - (2) P_4O_{10}
 - (3) $(\text{HPO}_3)_3$
 - (4) (1) & (2) both have same
26. Which of the following oxide does not give any oxyacid in aqueous solution ?
- (1) N_2O_5
 - (2) Cl_2O_7
 - (3) CrO_3
 - (4) N_2O
27. Which is not correct ?
- (1) Borax : Cyclic, 2-(six member ring)
 - (2) Calgon : Cyclic, (10 member ring)
 - (3) Beryl : Cyclic silicate
 - (4) P_4O_{10} : Cyclic, four -(Six member ring)
28. Number of peroxide linkage in CrO_5 , H_2SO_5 , $\text{H}_2\text{S}_2\text{O}_8$ are respectively :-
- (1) 2, 1, 2
 - (2) 2, 2, 2
 - (3) 1, 1, 1
 - (4) 2, 1, 1
29. Which of the following salt does not give any ppt with AgNO_3 sol.:
- (1) F^- salt
 - (2) Cl^- salt
 - (3) Br^- salt
 - (4) I^- salt

30. Find the incorrect match :-
 (1) Al_2Cl_6 : 3c-4e bond is present
 (2) $\text{Al}_2(\text{CH}_3)_6$: All carbon atoms are sp^3 hybridised
 (3) I_2Cl_6 : Nonplanar
 (4) B_2H_6 : Nonpolar
31. Predominantly ionic halide of N-family is :-
 (1) BiF_3 (2) BiCl_3
 (3) PF_3 (4) NF_3
32. In the following reaction
 $2\text{X} + \text{B}_2\text{H}_6 \rightarrow [\text{BH}_2(\text{X})_2]^+ [\text{BH}_4]^-$
 then X will be :-
 (1) NH_3 (2) CH_3NH_2
 (3) $\text{N}(\text{CH}_3)_2\text{H}$ (4) All of these
33. Which of the following reaction is not feasible?
 (1) $\text{F}_2 + 2\text{Cl}^- \longrightarrow 2\text{F}^- + \text{Cl}_2$
 (2) $\text{Cl}_2 + 2\text{Br}^- \longrightarrow 2\text{Cl}^- + \text{Br}_2$
 (3) $\text{Br}_2 + 2\text{F}^- \longrightarrow 2\text{Br}^- + \text{F}_2$
 (4) $\text{Br}_2 + 2\text{I}^- \longrightarrow 2\text{Br}^- + \text{I}_2$
34. Which of the following reaction is nonspontaneous ?
 (1) $2\text{F}_2 + 2\text{H}_2\text{O} \longrightarrow 4\text{HF}(\text{aq}) + \text{O}_2$
 (2) $\text{Cl}_2 + \text{H}_2\text{O} \longrightarrow \text{HCl} + \text{HOCl}$
 (3) $\text{Br}_2 + \text{H}_2\text{O} \longrightarrow \text{HBr} + \text{HOBr}$
 (4) $2\text{I}_2 + 2\text{H}_2\text{O} \longrightarrow 4\text{HI} + \text{O}_2$
35. Which of the following order is not correct :-
 (1) $\text{HI} > \text{HF} > \text{HBr} > \text{HCl}$ melting point
 (2) $\text{HF} > \text{HI} > \text{HBr} > \text{HCl}$ boiling point
 (3) $\text{HF} < \text{HCl} < \text{HBr} < \text{HI}$ pK_a
 (4) $\text{HF} < \text{HCl} < \text{HBr} < \text{HI}$ reducing strength
36. Which of the following order is not correct :-
 (1) $\text{CO}_2 < \text{SiO}_2 < \text{GeO}_2 < \text{SnO}_2 < \text{PbO}_2$ (Oxidising nature)
 (2) $\text{MnO}_4^- > \text{TcO}_4^- > \text{ReO}_4^-$ (Oxidising nature)
 (3) $\text{CH}_4 < \text{SiH}_4 < \text{GeH}_4 < \text{SnH}_4 < \text{PbH}_4$ (Reducing nature)
 (4) $\text{HOCl} < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$ (Oxidising nature)
37. Which of the following is a set of reducing agents :-
 (1) $\text{HNO}_3, \text{Fe}^{+2}, \text{Fe}$ (2) $\text{F}^-, \text{Cl}^-, \text{MnO}_4^-$
 (3) $\text{I}^-, \text{Na}, \text{Fe}^{+2}$ (4) $\text{Cr}_2\text{O}_7^{-2}, \text{NaCl}$
38. Which of the following compound is used for estimation of CO ?
 (1) I_2O_5 (2) $\text{KI} + \text{H}_2\text{O}$
 (3) I_2 (4) Cl_2O_6
39. Which of the following statement is not correct ?
 (1) There are only 12 bonding electron available in one molecule of diborane
 (2) $\text{B}_3\text{N}_3\text{H}_6$ is an electron deficient compound
 (3) Graphite is thermodynamically most stable crystalline allotrope of carbon
 (4) In $\text{Si}_2\text{O}_7^{6-}$ anion, one oxygen of a SiO_4^{4-} tetrahedron is shared with another SiO_4^{4-} tetrahedron.
40. Which of the following group of molecules can act both as oxidant as well as reductant :-
 (1) $\text{KMnO}_4, \text{O}_3, \text{SO}_3$
 (2) $\text{HClO}_4, \text{HNO}_3, \text{H}_2\text{O}_2$
 (3) $\text{HNO}_3, \text{SO}_2, \text{O}_3$
 (4) $\text{HNO}_2, \text{SO}_2, \text{H}_2\text{O}_2$
41. What is the hybridization on the central atom of SiO_2 ?
 (1) sp (2) sp^2
 (3) sp^3 (4) sp^3d
42. In which of the following reaction, product are not correctly matched ?
 (1) $\text{HNO}_{3(\text{aq.})} + \text{P}_{4}\text{O}_{10(\text{s})} \rightarrow \text{N}_2\text{O}_3$
 (2) $\text{NH}_4\text{Cl} \xrightarrow{\Delta} \text{NH}_3 + \text{HCl}$
 (3) $\text{Ca}_3\text{P}_2 + 6\text{H}_2\text{O} \rightarrow 2\text{PH}_3 + 3\text{Ca}(\text{OH})_2$
 (4) $\text{NH}_4\text{Cl}_{(\text{aq.})} + \text{NaNO}_{2(\text{aq.})} \xrightarrow{\Delta} \text{N}_2$
43. Inert gases are least reactive due to :-
 (1) Completely filled valence shell electronic configuration
 (2) High ionisation energy
 (3) More positive electron gain enthalpy.
 (4) All of these
44. Which of the following compound does not exist ?
 (1) KrF_2 (2) XeF_4
 (3) NeF_2 (4) XeO_3

45. Which one of the following reactions of Xenon compounds is not feasible ?
 (1) $3\text{XeF}_4 + 6\text{H}_2\text{O} \rightarrow 2\text{Xe} + \text{XeO}_3 + 12\text{HF} + 1.5\text{O}_2$
 (2) $2\text{XeF}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{Xe} + 4\text{HF} + \text{O}_2$
 (3) $\text{XeF}_6 + \text{RbF} \rightarrow \text{Rb}[\text{XeF}_7]$
 (4) $\text{XeO}_3 + 6\text{HF} \rightarrow \text{XeF}_6 + 3\text{H}_2\text{O}$
46. Which of the following order is not correct :-
 (1) $\text{NH}_3 > \text{SbH}_3 > \text{PH}_3 < \text{AsH}_3$ melting point
 (2) $\text{NH}_3 > \text{PH}_3 > \text{AsH}_3 > \text{SbH}_3$ proton affinity
 (3) $\text{CH}_4 < \text{SiH}_4 < \text{GeH}_4 < \text{SnH}_4$ thermal stability
 (4) $\text{H}_2\text{O} > \text{H}_2\text{Te} > \text{H}_2\text{Se} > \text{H}_2\text{S}$ boiling point
47. Which of the following is covalent carbide ?
 (1) CaC_2 (2) Al_4C_3
 (3) SiC (4) Be_2C
48. Which of the following halides cannot be hydrolysed?
 (1) TeF_6 (2) SF_6 (3) PCl_5 (4) PCl_3
49. Which of the following statements is not correct
 (1) FeSO_4 solution is used for absorption of NO
 (2) NH_4NO_3 gives N_2O on heating
 (3) PbNO_3 gives paramagnetic, brown coloured gas on thermal decomposition.
 (4) PCl_5 acts as an oxidising agent but not as reducing agent.
50. Which product is formed when excess Cl_2 reacts with NH_3 ?
 (1) NCl_3 (2) $\text{H}_2\text{N}-\text{NH}_2$
 (3) N_2 (4) NH_4Cl
51. The point of dissimilarity between $(\text{SO}_3)_3$ and $(\text{HPO}_3)_3$ (cyclic trimer) is :-
 (1) Both have six membered ring.
 (2) Both contain central atom in same hybridisation.
 (3) Both have equal π bonds
 (4) Both are isoelectronic
52. Which of following gives only basic product on hydrolysis ?
 (1) PCl_5 (2) NCl_3 (3) Mg_3N_2 (4) SO_2
53. $p\pi-d\pi$ bonding is not formed between oxygen and
 (1) Phosphorus in P_4O_{10}
 (2) Nitrogen in N_2O_5
 (3) Chlorine in HClO_4
 (4) Chlorine in anionic part of solid Cl_2O_6
54. Which one of the following orders is not in accordance with the property stated against it?
 (1) $\text{F} > \text{Cl} > \text{Br} > \text{I}$; electronegativity
 (2) $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$; bond dissociation energy
 (3) $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$; oxidizing power
 (4) $\text{HI} > \text{HBr} > \text{HCl} > \text{HF}$; acidic property in water
55. Which of the following is not correctly matched?
 (1) SF_6 – Octahedral, all possible bond angles are identical.
 (2) SF_4 , $\text{TeCl}_4 = sp^3d$, see-saw shape
 (3) Solid $\text{SO}_3 \Rightarrow sp^3$, six $p\pi-d\pi$ bonds are present
 (4) $\text{SO}_2 \rightarrow$ both $p\pi-p\pi$ and $p\pi-d\pi$ bonds are present
56. Ratio of σ & π bond in P_4O_{10} is :-
 (1) 4 (2) 3 (3) 2 (4) 1
57. Which of the following is correct ?
 (1) P–O bonds in P_4O_6 molecule are 6
 (2) P–P bonds in P_4 molecule are 6
 (3) P–O–P bonds in P_4O_6 molecule are 8
 (4) Both (1) and (3)
58. Which of the following is not correctly matched?
 (1) XeF_2 and $\text{XeF}_4 \Rightarrow$ Non polar but planar.
 (2) $\text{XeF}_6 \Rightarrow$ exists in solid state as XeF_5^+ and F^-
 (3) $\text{XeOF}_4 \Rightarrow sp^3d^2$, square pyramidal shape, all identical B.L.
 (4) $\text{XeO}_3 \Rightarrow$ pyramidal, all bond angles are identical.
59. Total number of lone pair of electron and P–O–P linkage present in dimer of P_2O_5 are :-
 (1) 16, 4 (2) 20, 6 (3) 22, 6 (4) 30, 4
60. Find the incorrect match :-
 (1) Al_2Cl_6 : 3C-4e bond is present
 (2) $\text{Al}_2(\text{CH}_3)_6$: All carbon atoms are sp^3 -hybridized
 (3) I_2Cl_6 : Maximum atoms in same plane = 6
 (4) Al_2Br_6 : 2c-2e-bond is present
61. Incorrect statement for H_2SO_4 is :-
 (1) High volatile
 (2) Strong acidic character
 (3) Dehydrating agent
 (4) Oxidising agent

62. Which of the following statement is not correct?
- Oxidising power = $\text{SiCl}_4 < \text{SnCl}_4 < \text{PbCl}_4$
 - The ionic character of lead (II) halide decreases with increase in atomic number of halogen.
 - Melting point and boiling point of halogen increases down the group due to increase in London-dispersion force.
 - The liquification of Noble gases decreases down the group.
63. The reaction of white phosphorus with aqueous NaOH gives phosphine along with another phosphorus containing compound. The reaction type ; the oxidation states of phosphorus in phosphine and the other product are respectively :-
- redox reaction ; -3 and -5
 - redox reaction ; +3 and +5
 - disproportionation reaction ; -3 and +1
 - disproportionation reaction ; -3 and +3
64. Catalyst for Deacon's process :-
- CuCl_2
 - Fe_2O_3
 - V_2O_5
 - NO
65. Which is not the use of sulphuric acid ?
- Petroleum refining
 - Detergent industry
 - Manufacture of aqua regia
 - In storage batteries
66. Which of following species do not give borax bead test ?
- Co^{+3}
 - Cr^{+3}
 - Ni^{2+}
 - Au^{+}
67. In layer test of I^- and Br^- . If reddish -brown layer comes first then :-
- Br^- present
 - I^- absent
 - Both (1) and (2)
 - None of these
68. Which of the following shows disproportionation ?
- $\text{Cl}_2 \xrightarrow[\text{dil. NaOH}]{\text{Cold}}$
 - $\text{KCl} \xrightarrow[\text{H}_2\text{SO}_4]{\text{Conc.}}$
 - $\text{F}_2 \xrightarrow{\text{H}_2\text{O}}$
 - $\text{H}_3\text{PO}_4 \xrightarrow{(\Delta)}$
- Paragraph for Q. 69 to Q. 72**
- (A) $\xrightarrow[\text{heated}]{\text{Strongly}}$ B + C
(Hydrated salt) transparent glassy bead
- $\text{H}_3\text{BO}_3 \xrightarrow[\text{heated}]{\text{Strongly}}$ C + D
69. Identify C :-
- $(\text{BN})_x$
 - NaPO_3
 - B_2O_3
 - $\text{Mg}(\text{NH}_4)\text{PO}_4$
70. Find the number of water of crystallizations in (A) :-
- 4
 - 5
 - 10
 - 24
71. How many X-O-X linkages are present in structure of A (X = central atom) :-
- 4
 - 3
 - 5
 - 2
72. Find the number of tetrahedral and trigonal planar units in structure of A -
- 2,1
 - 2,2
 - 2,4
 - 5,2
73. In S_8 each sulphur atom is :-
- sp hybridised with a planar ring
 - sp^3 hybridised with a planar ring
 - sp^3 hybridised with a non-planar ring
 - sp^3d hybridised two sulphur atoms
74. The percentage of p-character in the orbital forming P-P bonds in P_4 is :-
- 25
 - 75
 - 33
 - 100
75. Inorganic benzene reacts with HCl to form a compound $\text{B}_3\text{N}_3\text{H}_9\text{Cl}_3$. The protonation occurs at ?
- B-atom
 - First at N-atom, then rearranges into B-atom
 - N-atom
 - First at B-atom, then rearranges into N-atom
76. Nitrogen gas is liberated by thermal decomposition of ?
- NH_4NO_2
 - NaN_3
 - $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$
 - All

77. When excess amount of NH_3 is reacted with Cl_2 gives ?
 (1) NH_4Cl
 (2) N_2
 (3) NCl_3
 (4) (1) & (2) both
78. Most stable tri halides of nitrogen :-
 (1) NCl_3 (2) NF_3 (3) NBr_3 (4) NI_3
79. Which of following acid can be prepared by using conc. H_2SO_4 from its corresponding salt?
 (1) HF (2) HBr
 (3) (1) & (2) both (4) HI
80. Consider



If A is H_2SO_4 then incorrect statement is :-

- (1) Hydrolysis of E produces H_2O_2
 (2) D has maximum oxidation state of S
 (3) Both E and F contains peroxide linkage
 (4) C is caro's acid

81. The hybridisation of Xe and Sb in product when XeF_4 react with SbF_5 :-
 (1) sp^3d , sp^3d^2
 (2) sp^3d^2 , sp^3d
 (3) sp^3 , sp^3d^2
 (4) sp^3d^3 , sp^3d
82. $\text{PH}_4\text{I} + \text{KOH} \longrightarrow \text{A} + \text{B} + \text{H}_2\text{O}$
 (gas) (salt)
 Incorrect statement :-
 (1) 'A' is inflammable gas in pure form
 (2) 'B' is salt of (SB + SA)
 (3) PH_3 has bond angle approx 90°
 (4) 'A' is a weaker lewis base than NH_3
83. In which of the following molecule, vacant orbital is not necessary for dimer formation ?
 (1) BH_3 (2) AlCl_3
 (3) CH_3COOH (4) $\text{BeCl}_2(\text{s})$
84. Which of the following compound does not have hydrogen bonding ?
 (1) K_2HPO_4 (2) K_2HPO_3
 (3) $\text{NaHCO}_3(\text{s})$ (4) $\text{CH}_3-\text{C}=\text{CH}-\text{C}(=\text{O})-\text{CH}_3$
 $\text{O}-\text{H}$

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	4	4	4	1	4	3	3	4	3	3	2	3	1	2	2
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans	4	3	2	4	2	2	4	4	4	4	4	2	4	1	3
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans	1	4	3	4	3	4	3	1	2	4	3	1	4	3	4
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans	3	3	2	4	1	3	3	2	2	1	1	2	3	2	3
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans	1	4	3	1	3	4	3	1	3	3	3	2	3	2	3
Que.	76	77	78	79	80	81	82	83	84						
Ans	4	4	2	1	4	1	1	3	2						

s-BLOCK ELEMENT

- Which of the following order of L.E. is not correct :-
 (1) $\text{Al}_2\text{O}_3 < \text{MgO} < \text{Na}_2\text{O}$
 (2) $\text{NaF} < \text{MgO} < \text{ScN} < \text{TiC}$
 (3) $\text{KBr} < \text{LiF} < \text{MgO}$
 (4) $\text{LiF} > \text{NaF} > \text{KF}$
- Which of the following compound has ionic bond, π -bond, co-ordinate bond and covalent bond ?
 (1) HNO_2 (2) NaNO_3
 (3) KNO_2 (4) MgCl_2
- Which show highest lattice energy ?
 (1) CsI (2) MgO (3) CaS (4) NaF
- Which of the following melting point order is not correct ?
 (1) $\text{NaF} < \text{MgF}_2 < \text{AlF}_3$
 (2) $\text{NaCl} > \text{MgCl}_2 > \text{AlCl}_3$
 (3) $\text{LiCl} > \text{NaCl} > \text{KCl} > \text{RbCl}$
 (4) $\text{NaCl} > \text{AgCl}$
- In which of the following cases the covalent character and the melting point order are same?
 (1) $\text{BeCl}_2, \text{CaCl}_2, \text{BaCl}_2$
 (2) $\text{NaCl}, \text{MgCl}_2, \text{AlCl}_3$
 (3) $\text{BeO}, \text{MgO}, \text{CaO}$
 (4) $\text{NaF}, \text{MgF}_2, \text{AlF}_3$
- Which of the following is correct statement ?
 (a) AlCl_3 is conducting in fused state
 (b) Mobility of Li^+ ion in water is greater than Cs^+ ion
 (c) MCl_2 is more volatile than MCl_4
 (d) BeSO_4 is more soluble in water than BaSO_4
 (1) a, b (2) b, c, d
 (3) b, d (4) Only d
- Which one is more ionic in nature among lithium halides ?
 (1) LiF (2) LiCl (3) LiBr (4) LiI
- Strongest reducing agent among alkali metals and alkaline earth metals are respectively :-
 (1) Li, Ba (2) Cs, Ba (3) Li, Be (4) Na, Be
- Least mobile ion is :-
 (1) $[\text{Be}(\text{H}_2\text{O})_n]^{+2}$ (2) $[\text{Na}(\text{H}_2\text{O})_n]^+$
 (3) $[\text{Mg}(\text{H}_2\text{O})_n]^{+2}$ (4) $[\text{Li}(\text{H}_2\text{O})_n]^+$
- Choose the compound of maximum and minimum ionic character from LiCl , RbCl , BeCl_2 and MgCl_2
 (1) LiCl and RbCl (2) RbCl and BeCl_2
 (3) RbCl and MgCl_2 (4) MgCl_2 and BeCl_2
- Which of the following will be most covalent?
 (1) NaCl (2) Na_2S (3) MgCl_2 (4) MgS
- Which of the following is not a correct order of solubility in water ?
 (1) $\text{LiOH} < \text{NaOH} < \text{KOH} < \text{RbOH}$
 (2) $\text{AgF} > \text{AgCl} > \text{AgBr} > \text{AgI}$
 (3) $\text{BeF}_2 < \text{BeCl}_2 < \text{BeBr}_2 < \text{BeI}_2$
 (4) $\text{BeSO}_4 > \text{MgSO}_4 > \text{CaSO}_4 > \text{BaSO}_4$
- Which of the following is maximum soluble in organic solvent ?
 (1) LiF (2) LiCl (3) LiBr (4) LiI
- Among the following group-I carbonate having highest solubility ?
 (1) Li_2CO_3 (2) Na_2CO_3
 (3) K_2CO_3 (4) Rb_2CO_3
- Alkaline earth metal carbonates are decomposed on heating and produce residue. Thermal stability of reactant and residue will be - On moving down the group :-
 (1) Increases and decreases respectively
 (2) Decreases and increases respectively
 (3) Increases and increases
 (4) Decreases and decreases
- Which of the following bicarbonate can exist in solid state ?
 (1) LiHCO_3 (2) $\text{Mg}(\text{HCO}_3)_2$
 (3) $\text{Zn}(\text{HCO}_3)_2$ (4) KHCO_3

17. Which of the following compounds on thermal decomposition yields a basic as well as acidic oxides?
(1) KClO_3 (2) NaNO_3 (3) K_2CO_3 (4) MgCO_3
18. Which of the following equilibrium would have highest value of K_p at a common temperature:-
(1) $\text{BeCO}_3 \rightleftharpoons \text{BeO} + \text{CO}_2$
(2) $\text{SrCO}_3 \rightleftharpoons \text{SrO} + \text{CO}_2$
(3) $\text{CaCO}_3 \rightleftharpoons \text{CaO} + \text{CO}_2$
(4) $\text{BaCO}_3 \rightleftharpoons \text{BaO} + \text{CO}_2$
19. Which of the following compound gives paramagnetic gas on heating ?
(1) LiNO_3 (2) NaNO_3
(3) KNO_3 (4) All of these
20. Which of the following is incorrect order ?
(1) $\text{Na}_2\text{O}_2 < \text{K}_2\text{O}_2 < \text{Rb}_2\text{O}_2 < \text{Cs}_2\text{O}_2$
(Thermal stability order)
(2) $\text{LiHCO}_3 < \text{NaHCO}_3 < \text{KHCO}_3 < \text{RbHCO}_3 < \text{CsHCO}_3$
(Thermal stability order)
(3) $\text{LiH} < \text{NaH} < \text{KH} < \text{RbH}$
(Thermal stability order)
(4) $\text{LiH} > \text{NaH} > \text{KH} > \text{RbH}$
(Thermal stability order)
21. Which order are correct ?
(a) $\text{BeSO}_4 > \text{MgSO}_4 > \text{CaSO}_4 > \text{SrSO}_4 > \text{BaSO}_4$
(Solubility)
(b) $\text{ZnO} > \text{BeO} > \text{MgO} > \text{CaO}$
(Basic nature)
(c) $\text{LiOH} > \text{NaOH} > \text{KOH} > \text{RbOH} > \text{CsOH}$
(Solubility in water)
(d) $\text{NaCl} > \text{KCl} > \text{RbCl} > \text{CsCl} > \text{LiCl}$
(Melting point)
(1) a, b, d (2) b, c
(3) a, d (4) All correct

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	1	2	2	3	4	4	1	1	1	2	4	3	4	4	1
Que.	16	17	18	19	20	21									
Ans	4	4	1	4	3	3									

METALLURGY

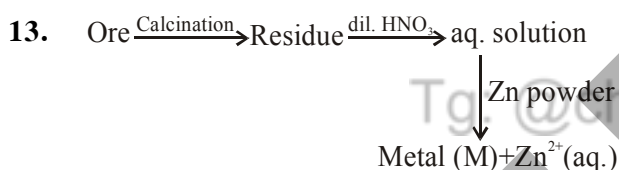
- In order to refine "copper" it is melted in a furnace and it is stirred with green logs of wood. The purpose is :-
 - (1) to expel the dissolved gases in blister copper
 - (2) to reduce the metallic oxide impurities with hydrocarbon gases liberated from the wood
 - (3) to bring the impurities to surface and oxidise them
 - (4) to increase the carbon content in copper
- The process which involves the treatment of the ore with a suitable reagent as to make it soluble while impurities remain insoluble is called :-
 - (1) froth floatation process
 - (2) leaching
 - (3) self reduction
 - (4) electrometallurgy
- Select correct matching :-
 - (1) Pyrometallurgy : Extraction of Fe
 - (2) Electrometallurgy : Extraction of Al
 - (3) Hydrometallurgy : Extraction of Au
 - (4) All above are correct
- Read the following statements :-
 - (I) Al has greater affinity than that of Cr, for oxygen
 - (II) Al can be used for reduction of Fe_2O_3
 - (III) $\text{C} + \frac{1}{2}\text{O}_2 \longrightarrow \text{CO}$, Slope of this process is upwards in elingham diagram.
 - (IV) SnO_2 can be reduced by carbon
 Choose the correct set of statement(s)
 - (1) I, III
 - (2) I, II, IV
 - (3) I, II, III
 - (4) All of these
- Which of the following is incorrect ?
 - (1) Leaching is a method to remove quantitatively Fe_2O_3 from red bauxite
 - (2) Metallurgy of gold involves pyrometallurgical process form soluble complex
 - (3) Metallurgy of silver involves hydrometallurgical process form soluble complex
 - (4) Self reduction is not possible during metallurgy of Mg
- Which of the reactions occurs in slag formation zone in blast furnace for manufacture of iron ?
 - (1) $\text{Fe}_2\text{O}_3 + 3\text{C} \rightarrow 2\text{Fe} + 3\text{CO}$
 - (2) $\text{CO}_2 + \text{C} \rightarrow 2\text{CO}$
 - (3) $\text{FeO} + \text{SiO}_2 \rightarrow \text{FeSiO}_3$
 - (4) $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$
- Which of the following diagram is correctly related to the extraction of Zn from calamine ?
 - (1) $\text{Calamine} \xrightarrow{\text{Roasting}} \text{Roasted ore} \xrightarrow{\text{Heating with calamine}} \text{Zn}$
 - (2) $\text{Calamine} \xrightarrow{\text{Roasting with air}} \text{Roasted ore} \xrightarrow{\text{Carbon reduction}} \text{Zn}$
 - (3) $\text{Calamine} \xrightarrow{\text{Calcination}} \text{Calcinated ore} \xrightarrow{\text{Reduction by Hg}} \text{Zn}$
 - (4) $\text{Calamine} \xrightarrow{\text{Calcination}} \text{Calcinated ore} \xrightarrow{\text{Reduction by Carbon}} \text{Zn}$
- Select the flow diagram which is correct for extraction of particular metal from its ore ?
 - (1) Tin stone $\xrightarrow{\text{Magnetic separation}} \text{SnO}_2 \xrightarrow{\text{Self reduction}} \text{Sn(impure)} \xrightarrow{\text{distillation}} \text{Sn(pure)}$
 - (2) Red Bauxite $\xrightarrow{\text{Serpeck's process}} \text{Al}_2\text{O}_3 \xrightarrow{\text{Electrolytic reduction}} \text{Al(impure)} \xrightarrow{\text{Electrolytic refining}} \text{Al(pure)}$
 - (3) Galena $\xrightarrow{\text{Froth floatation}} \text{PbS} \xrightarrow{\text{Partial roasting + Self reduction}} \text{Pb(impure)} \xrightarrow{\text{Electrolytic refining}} \text{Pb(pure)}$
 - (4) Haematite $\xrightarrow{\text{Leaching by NaOH}} \text{Fe}_2\text{O}_3 \xrightarrow{\text{Carbon reduction}} \text{Fe(impure)} \xrightarrow{\text{Electrolytic refining}} \text{Fe(pure)}$
- Both copper carbonate and copper hydroxide are present in :-
 - (1) malachite
 - (2) azurite
 - (3) chalcopryrite
 - (4) Both (1) and (2)
- $\text{Ag}_2\text{S} + \text{KCN} \xrightarrow{\text{Excess}} [\text{Ag}(\text{CN})_x]^{-n}$
 $[\text{Ag}(\text{CN})_x]^{-n} + \text{Zn (Powder)} \rightarrow [\text{Zn}(\text{CN})_y]^{-m}$
 Find the sum of x and y :-
 - (1) 4
 - (2) 6
 - (3) 8
 - (4) 10

11. When ZnS and PbS minerals are present together, Then NaCN added to separate them in the froth floatation process as a depressant, because :-

- (1) $\text{Pb}(\text{CN})_2$ is precipitated while no effect on ZnS
- (2) ZnS forms soluble complex $\text{Na}_2[\text{Zn}(\text{CN})_4]$
- (3) PbS forms soluble complex $\text{Na}_2[\text{Pb}(\text{CN})_4]$
- (4) It decreases the floatation property of PbS by making it hydrophilic

12. Which of the following statement is not correct regarding calcination ?

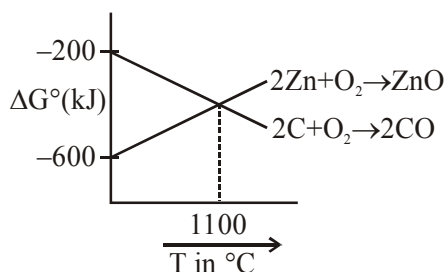
- (1) Impurities are removed in the form of elemental vapours
- (2) Carbonate ores convert into their oxides
- (3) Temperature of the process is maintained below the melting point of the mixture
- (4) Lower oxidation state oxides are oxidised further



above metallurgy is possible when ore is :-

- (1) ZnCO_3
- (2) $\text{CaCO}_3 \cdot \text{MgCO}_3$
- (3) $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$
- (4) PbS

14. The Ellingham diagram of ZnO and CO is converting in corresponding oxides is :-



To make $\text{ZnO} + \text{C} \xrightarrow{\Delta} \text{Zn} + \text{CO}$ reduction process spontaneous, temperature should be :

- (1) 1000°C
- (2) $> 1100^\circ\text{C}$
- (3) $< 500^\circ\text{C}$
- (4) $< 1100^\circ\text{C}$

15. Which of the following is not correctly matched ?

- (1) Removal of its own oxide impurity from impure Cu $\Rightarrow$ Poling process
- (2) Removal of Pb impurity from impure Ag $\Rightarrow$ Cupellation
- (3) Obtaining wrought iron from cast iron $\Rightarrow$ Bessemerisation
- (4) Refining of Nickel $\Rightarrow$ Mond's process

16. The method of zone refining of metals is based on the principle of ?

- (1) Greater mobility of the pure metal than that of impurity
- (2) higher melting point of the impurity than that of the pure metal
- (3) Greater noble character of the solid metal than that of the impurity
- (4) Greater solubility of the impurity in the molten state than in the solid

17. The reduction of an oxide by aluminium is called :-

- (1) Bayer's process
- (2) Goldschmidt's aluminothermite process
- (3) Hall's process
- (4) van Arkel process

18. Which of the following sulphide ore is not concentrated by froth-floatation process ?

- (1) Galena
- (2) Zinc blend
- (3) Argentite
- (4) Cinnabar

19. Which of the following statement is correct regarding the slag formation during the extraction of a metal like copper or iron ?

- (1) The slag is lighter and lower melting than the metal
- (2) The slag is heavier and lower melting than the metal
- (3) The slag is lighter and higher melting than the metal
- (4) The slag is heavier and higher melting than the metal.

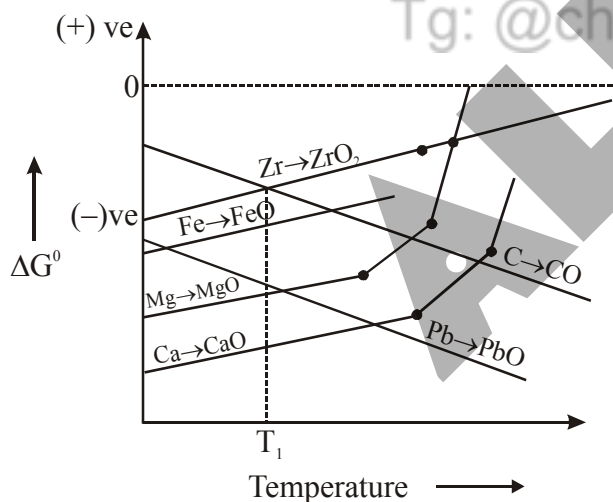
20. Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly ?

- (1) Metal sulphides are thermodynamically more stable than CS_2
- (2) CO_2 is thermodynamically more stable than CS_2
- (3) Metal sulphides are less stable than the corresponding oxides
- (4) CO_2 is more volatile than CS_2

21. In the context of the Hall-Heroult process for the extraction of Al, which of the following statements is false ?

- (1) Al^{3+} is reduced at the cathode to form Al
- (2) in this process oxygen is liberated at cathode.
- (3) CO and CO_2 are produced in this process
- (4) Al_2O_3 is mixed with CaF_2 which lowers the melting point of the mixture and brings conductivity

Paragraph for 22 to 24



22. Which of the above curve is wrongly presented ?

- (1) $C \rightarrow CO$
- (2) $Pb \rightarrow PbO$
- (3) $Zr \rightarrow ZrO_2$
- (4) $Mg \rightarrow MgO$

23. Which of the above metal oxide is having minimum thermal decomposition temperature ?

- (1) CaO
- (2) FeO
- (3) ZrO_2
- (4) MgO

24. Which of the following metal's oxide can be reduced by Fe as reducing agent at temperature (T_1) ?

- (1) Zr
- (2) Ca
- (3) Mg
- (4) None of these

25. Match column (I) (process) with column (II) (electrolyte)

- | Column (I) (process) | Column (II) (electrolyte) |
|----------------------------|---|
| (1) Castner Kellner's cell | (P) Cu |
| (2) Self-reduction | (Q) fused ($Al_2O_3 + Na_3AlF_6 + CaF_2$) |
| (3) Hall-Heroult process | (R) Brine solution |

26. Match the column :-

	Column-I		Column-II
1	Extracted by the reduction of ore by carbon	P	Ag
2	Extracted by the formation of soluble complex	Q	Zn
3	By product as anode mud of electrolytic refining of Cu	R	Fe
4	Metals involve in hydrometallurgy	S	Au

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	2	2	4	2	2	4	4	3	4	2	2	4	3	2	3
Que.	16	17	18	19	20	21	22	23	24	25					
Ans	4	2	3	1	3	2	2	4	1	(1) → R; (2) → P ; (3) → Q					
Que.	26														
Ans	1-Q,R, 2-P,S, 3-P,S, 4-P,S														

IMPORTANT NOTES

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